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report

MANPOWER STATISTICS DIVISION

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SOCIETY MEMBERSHIP 1981 PROFILE: AN EXPANDED VIEW

Beverly Fearn Porter and Roman Czujko

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society

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Introduction[1]

Despite the tightening economic situation, 1981 proved to be a relatively positive year for most members of the nine AIP member societies. Overall salaries kept pace with inflation and the unemployment rate remained negligible at 1%. However, the minor shift noted last year away from teaching as a principal work activity appears to have accelerated in 1981. Correlatively, university employment declined vis-à-vis industrial employment. The society membership was gradually aging; however, new members were also joining, frequently from quite different backgrounds than their predecessors. Vacuum Science, High Polymer Physics, Chemical Physics and Optics were four subfields which experienced a high input of new members during the past two years. A continuing westward geographical shift, particularly to the sunbelt states, could also be observed with a decrease in the proportion of members residing in several northern regions, most notably the North Central. Figure 1 illustrates the geographical distribution of society members in the spring of 1981.

These are some of the major findings highlighted in the 1981 profile of society membership. A larger sample size than in previous years allowed for an expanded view of society membership in the early 1980's. In addition to general demographic, employment and salary data, some attention could be focused on several small but vital subgroups: women, the self-employed, new society members, students, postdocs and Canadian members. Fuller profiles of each of the nine member societies are also presented.

The data for this report were developed from the expanded 1981 sample survey of U. S. and Canadian members; the sample was randomly selected but stratified to represent more fully the three smaller AIP member societies. Over one-sixth of the society members were contacted in addition to individuals from the original 1979 sample who dropped society membership during 1979 and 1980. The profile data in the body of the report refer only to individuals whose membership was current in 1981. This part of the report consists of text, illustrative figures and a few basic tables. Detailed tables presenting more extensive data on the variables discussed in the body can be found in Appendix C.

The initial part of the profile concentrates on society membership characteristics in 1981, with appropriate comparisons to the original 1979 membership sample. Special attention is paid to salary structures in response to the widespread interest during this tightened economic period. In addition, there is a discussion of the new members who joined during 1979–1980.

The next section examines the specific nature of change in the longitudinal part of the sample. The original 1979 sample was small; however, by 1981 over 2000 society members had responded more than once and were thus available for longitudinal, i.e., direct follow-up analysis. While the findings of this section are somewhat tentative in nature, due to the relatively small number of multiple respondents, they do provide suggestive ideas for in-depth longitudinal analysis. Such analysis will be possible next year since the expanded 1981 and 1982 samples will provide a longitudinal base more than twice the size of the current one. Change in any area is likely to occur slowly. However, monitoring the patterns observed, both through cross-sectional and longitudinal analysis should provide insight into the typical patterns of career development as well as the direction that physics and related science/engineering manpower is moving. The concluding section deals with profiles of each of the member societies and some major comparisons between them. While each society is an integral part of the physics and related science/engineering community, each one also has unique aspects which are as important to recognize.

Individuals who dropped membership are discussed separately in Appendix A. The methodology, definitions and limitations of this study along with copies of the questionnaire instrument are presented in the remaining Appendices.

Membership Composition

Figure 1 illustrates that society members are widely distributed geographically throughout the United

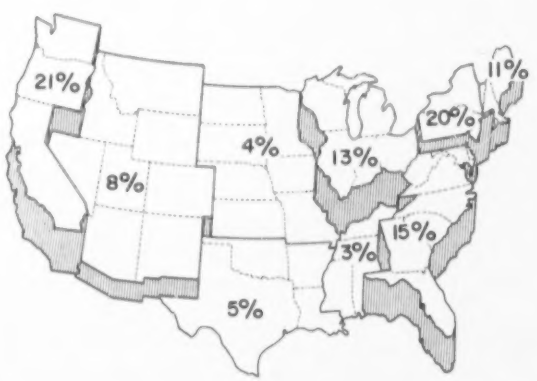


FIG. 1. Regional distribution of society members, 1981.

[1]The graphics included herein are primarily the product of Keith Skelton, a Manpower Statistics Division staff member. His graphics and computer work have been central to the production of this report. We would also like to thank Barbara Larity, Yin Ping Ho and Catherine Schwartz for their careful attention to typing, editing and composition.

States. It should be noted, however, that they are most heavily concentrated on the east and west coasts, with 2/3 of the members living in these areas. (In contrast, only 1/2 of the total U. S. population lives in these regions.) While the east coast concentration of members remained relatively stable over the past year, there was some increase in the sunbelt states. The major region of decline was the East North Central, which reflected changes also observed in the total U. S. population. A later section will take a look at the actual paths of geographical mobility in more detail.

The membership of the nine AIP member societies exhibits both cohesion and heterogeneity. As a whole, the membership has been trained and is currently working in Physics or Science and Engineering fields. Most members are male (94%), white (92%), and U. S. citizens (90%).[1] This is very similar to the distribution observed in 1979, although it does reflect a very slight increase in female and foreign citizen society members, up by one and two percentage points respectively. The preponderance of society members, nearly 70%, hold Ph. D.'s, a small increase since 1979.[2]

The diversity which exists within the membership of the nine AIP member societies is clearly illustrated in Fig. 2. While the majority of members professionally identify themselves as physicists, there is a substantial representation of engineers, chemists, astronomers and a smaller representation of biologists, mathematicians and computer scientists.[3] Among the "other scientists" can also be found psychologists, audiologists, medical technologists, material scientists, earth scientists and a variety of other small groups. While each of these other professional self-identification groups is small in terms of the overall membership, some do form a larger proportion in specific societies; psychologists, for example, play an important role in ASA, while a substantial number of material scientists can be found in AVS. Those who professionally identify themselves as outside of Science and Engineering are predominantly general administrators and educators, although there are a few who note a broad variety of other identifications ranging from salesman to theologian to artist. While professional self-identification is one of the slowest changing variables,[4] physicists represent a somewhat lower proportion of the society membership in 1981 than they did in 1979; chemists and other scientists represent a somewhat higher proportion.

Society members are a relatively young group, 1/3 born after the Second World War and 42% receiving their degrees since 1970. Only the small group of nonstudent bachelors degree holders among the membership are somewhat advanced in age, 48 years in contrast to 42 for Ph. D.'s and 44 for those nonstudents holding masters degrees. However, between 1979 and 1981, the total society member population including student members has slowly aged by about 1/5 of a year, the median age increasing from 41.6 to 41.8 years. The continuing members, those who were society members prior to 1979, have aged, as expected, two years over the period, from 41.6 to 43.6 years. It was the input of new members which dampened the "aging".[5] If there had been a heavier influx of new members, as occurred in the late 1960's and early 1970's, the median age of the society membership would have dropped.

Employment, 1981

Most society members, 89%, are employed full-time. The unemployment rate in 1981 was negligible at 1%. Those who are employed part-time, and those who are not employed and not seeking employment, are primarily the advanced graduate students or the retired. There is, however, a somewhat higher amount of part-time employment among women than men, 6% versus 2%.[6] The employment of society members—where they work, what they do and in which subfields they are involved—is affected by many factors. The following sections describe in some detail the work environment of society members in 1981 and the effect on employment of degree level and professional self-identification.

Employer

As Fig. 3 illustrates, universities, employing over one-third of the society members, remain the predominant employer in 1981; however, the gap between university and industrial employment is closing. Since 1979, university employment has declined by two percentage points, and industrial employment has increased by a similar amount. Thus, while the difference in 1979 between university and industrial employment was 8%, by 1981 this difference was halved. If part-time employed students are excluded, the difference

[1]These figures, and those in the remainder of the report refer only to members residing in the U. S. or Canada. Members residing abroad representing 12% of the total membership, were not contacted.

[2]Of the remaining masters and bachelors degree-holding society members, slightly over one-fifth are advanced graduate students.

[3]Any figures for this latter group should be considered a low estimate, since Computer Scientists as a professional self-identification category was introduced for the first time in 1980.

[4]See the longitudinal section for a discussion of the nature of those changes we have been able to observe directly.

[5]While individuals can, and do, become society members at varied ages, most new members are young. See the section on new members for further detail.

[6]This refers only to the nonstudent employed members. As the later discussion of all women society members indicates, a still greater sex differential occurs when students are included.

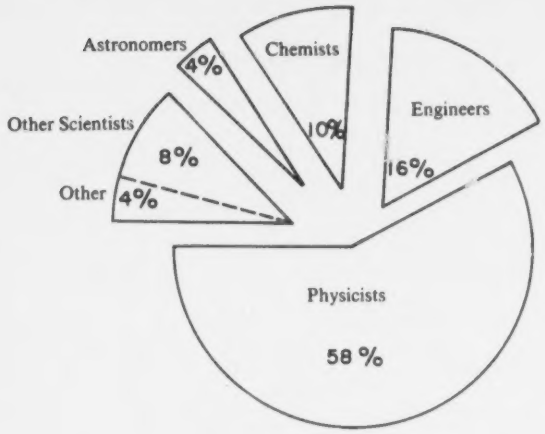


FIG. 2. Professional self-identification, 1981.

declines even further: 33% employed by universities, 32% by industry. The other employer types, both academic and nonacademic, remained relatively stable.

University and college employment, as illustrated in Fig. 4, is clearly the province of the Ph. D., although as Fig. 5 underlines, recent Ph. D. cohorts are less likely than older cohorts to be employed in universities and more likely to be employed by industry. At the junior college and secondary school level, however, masters degree holders predominate. While changes from 1979 are difficult to calibrate for these relatively small groups, there appears to have been a shift away from

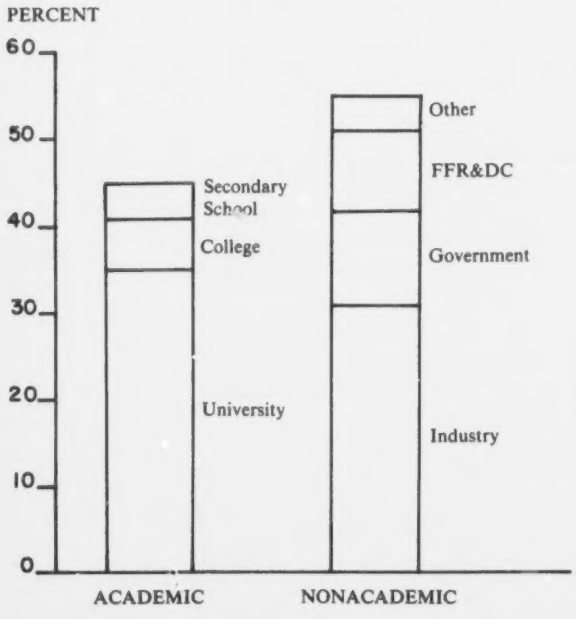


FIG. 3. Type of employer, 1981.

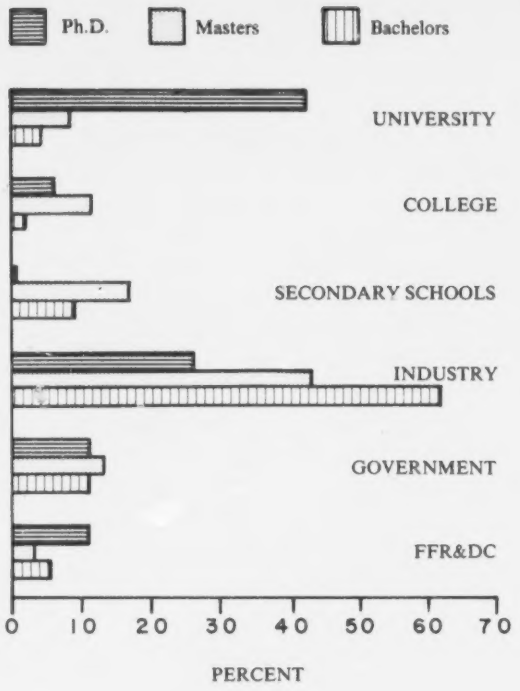


FIG. 4. Type of employer by highest degree, 1981.

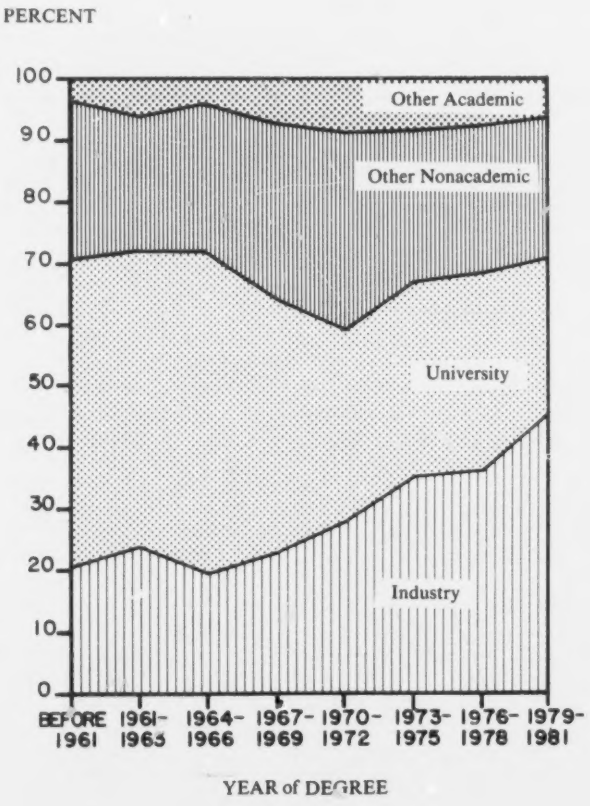


FIG. 5. Type of employer by cohort year of Ph. D., 1981.

the secondary schools by masters degree holders and perhaps an increased representation of members whose highest degree is a bachelor's.

Outside of academe, industrial employment, as noted earlier, remains predominant. Industry has the greatest diversity of degree holders. It is the major employer of bachelors, the central employer of masters and, after universities, the next largest employer of Ph. D.'s. Since 1979 Ph.D. employment in industry has increased slightly, while the industrial employment of masters has substantially increased by four percentage points. Changes in other types of employment have been minimal.

Place of employment also varies by professional self-identification. Those members who identify themselves as physicists and chemists are nearly evenly divided between academe and the employment sectors outside of academe: industry, government, national labs and nonprofit organizations. In contrast, biologists, astronomers and mathematicians are heavily based in academe while the majority of engineers and computer scientists are employed by industry.

Society members employed in industry tend to be concentrated in a relatively small number of large corporations. In 1981 nearly 1/3 of the members were located in 18 companies. The tail of the curve, however, was long, reflecting the many small companies where only a few society members were employed. Corporate and subsidiary changes in 1981 have been complex. However, the society members employed in the large corporations noted last year were more likely than those employed by other companies to be Ph. D.'s, and to be conducting basic and applied research. Next year, an analysis of society members working for the smaller companies should be possible.

Work Activities

Society members are involved in a broad range of work activities. While nearly 70% are primarily doing basic research, teaching or applied research, substantial numbers can also be found in administration, development and design/engineering. Since 1979, the percentage of members involved in teaching has declined by two percentage points to 23%, while the percentage involved in applied research has increased by a similar amount. This shift in work activity is related to the shift in employer type discussed earlier. As illustrated in Fig. 6, a society member's primary work activity is clearly affected by where he is working. Teaching and basic research predominate in the universities, while teaching alone is the overwhelming primary activity in other academic institutions. At the universities and colleges, nearly 85% of the faculty are tenured full and associate professors. In the national labs and government, basic and applied research are the primary

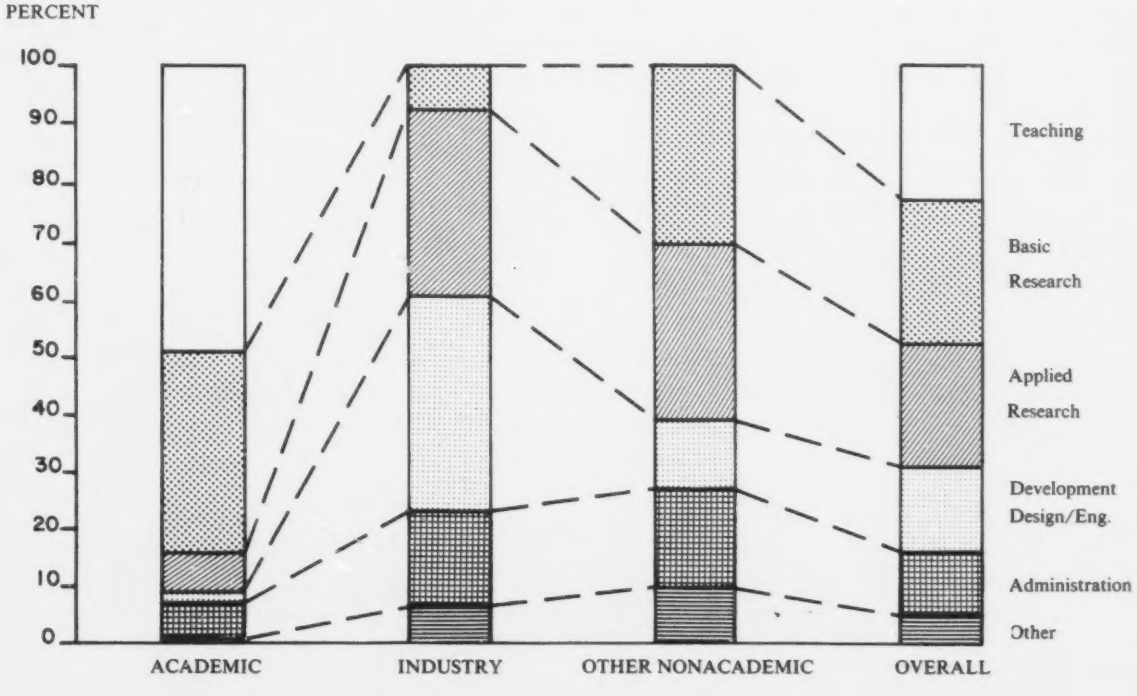


FIG. 6. Work activity by broad employer type, 1981.

activities, while in industry there is a broad distribution from applied research through development, design/engineering and administration, but little basic research.

Work activities also vary by level of highest degree. Part of this is due to the different employer concentrations at each degree level, but part is also due to variation within a given employment type. In industry, for example, where there is the greatest mixture of degree levels, we find a variation in work activity by degree level as illustrated in Fig. 7. The small amount of basic research in industry, and most of the applied research, is carried out predominantly by Ph. D.'s. The difference between the work activities of masters and bachelors is not as striking, but the masters are more likely than the bachelors to be doing some applied research, while the bachelors are somewhat more likely to be involved in design/engineering and other technical activities.

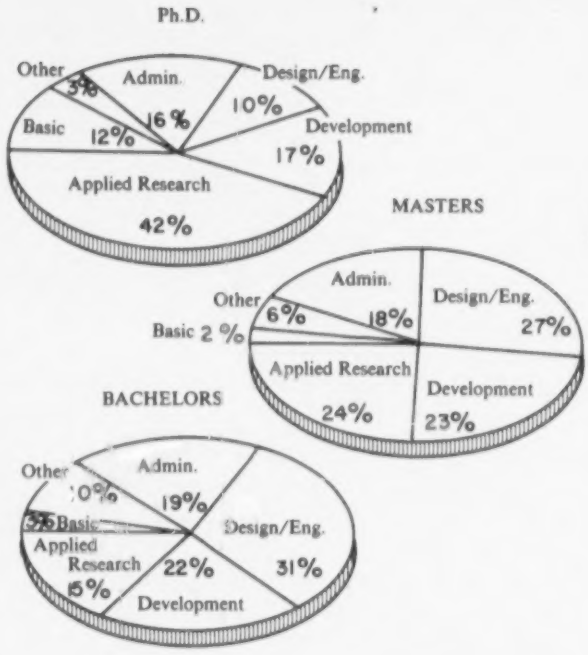


FIG. 7. Work activity in industry by highest degree, 1981.

Subfields

Members of the AIP member societies work in a broad variety of scientific and engineering fields and subfields. In 1981, two thirds were employed in Physics and Astronomy, nearly 15% in Engineering, over 15% in other science fields and 5% in nonscience areas. In broad field terms, this is very similar to the distribution observed in 1979.[1] In the following sections, the fields and subfields in which society members are working are examined in more detail. In the discussions of secondary subfields, and later of professional self-identification, the very close relationship between Physics and related science and engineering fields becomes apparent. In addition, there has been marked mobility between fields and subfields; sometimes this movement has been to closely related areas, at other times the shift has been more dramatic.

Composition

Within Physics, Solid State remains the major research field of employment, followed by Optics; employment in Optics has shown a clear growth over the past two years. Plasma Physics appears to have replaced Nuclear Physics as the third largest Physics research work subfield. Following in order of number of members employed in 1981 are: Nuclear Physics, Elementary Particles, Chemical Physics, Acoustics, Medical Physics, Atomic and Molecular Physics and Astrophysics. In general, experimentalists outnumbered theoreticians by about three to two. It should also be noted that in Optics, Medical Physics and Acoustics a significant proportion of members, ranging from 15% to nearly half, consider their work neither experimental nor theoretical. These ten subfields represent nearly 70% of those working in Physics and Astronomy research fields. Except for Acoustics, which appears somewhat less predominant as an employment field in 1981 than it did in 1979, the remaining major subfields are basically in the same rank order as they were earlier. Changes in the smaller subfields are difficult to calibrate using the different size samples which existed in 1979 and 1981. The two smaller areas in which employment appears to have risen over the past two years are Fluid Dynamics and Vacuum Science.

Electronic and Electrical Engineering are the primary Engineering subfields of employment for society members in 1981. Both have undergone major employment increases over the past two years. Systems Engineering is the third largest Engineering subfield for society members.

The major other science fields of employment remain Chemistry, Materials Science and Computer Science. Although numbers from the original 1979 sample are small, there appears to be an increasing involvement of members in Chemistry.

Degree Level

The fields and subfields in which members work are affected by a variety of factors. Certainly a central one is the level of highest degree obtained as illustrated in Fig. 8. Two-thirds of the Ph. D.'s society members are

[1]See Appendix C for complete 1981 field and subfield detail.

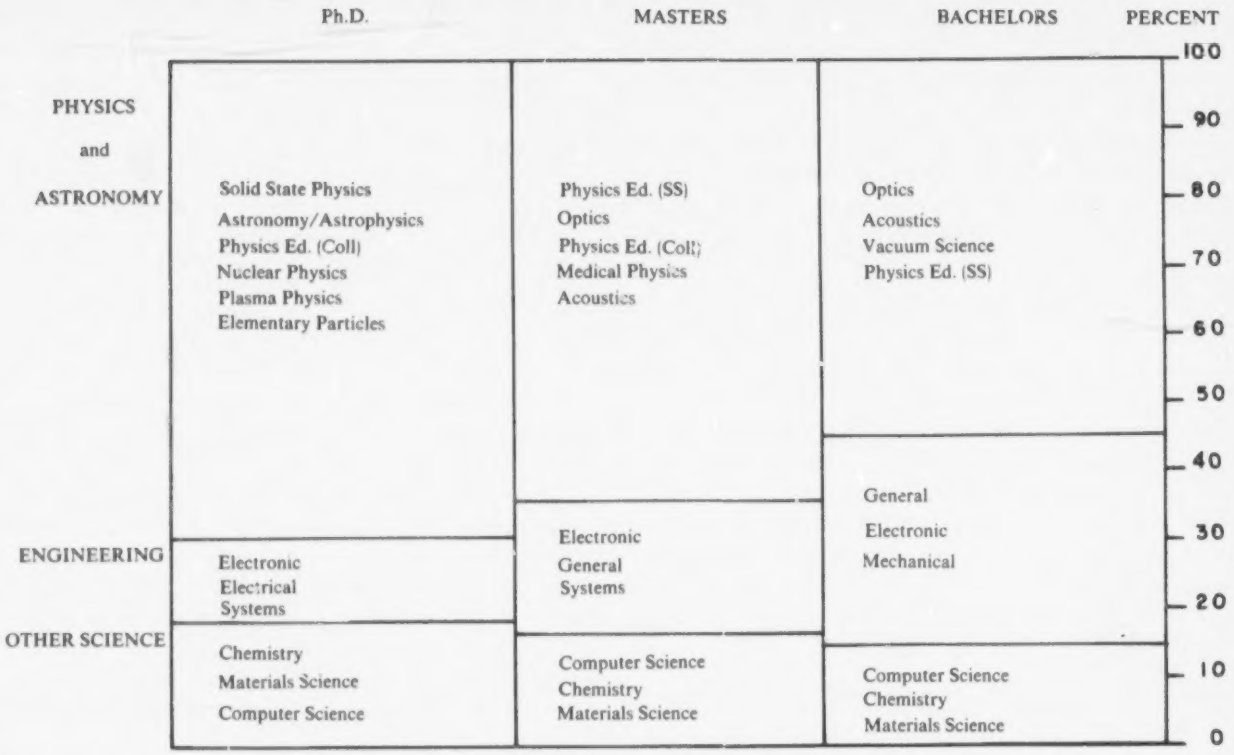


FIG. 8. Predominant fields and subfields of work by highest degree, 1981.

working in Physics and Astronomy subfields, primarily in the ten major research areas outlined earlier. Physics education at the college level is also a major subfield involvement for Ph. D.'s.

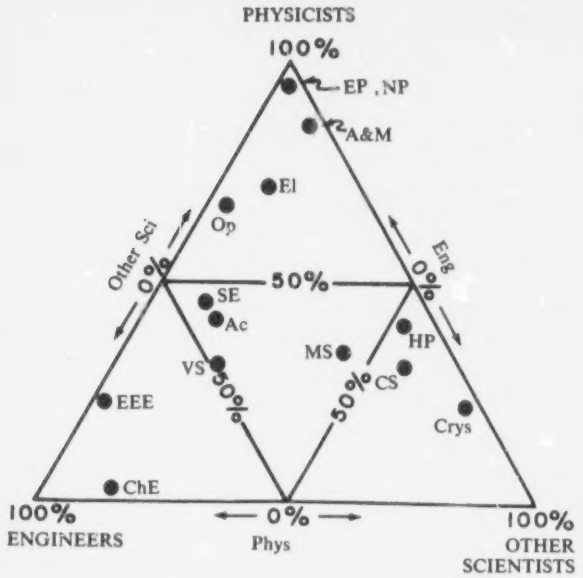
At the lower degree levels, fields and subfield concentrations change. While many masters degree holders are working in Physics education, it is more typically at the junior college and secondary school level. Among the bachelors degree holders, involvement in Physics education is minor and almost exclusively in the secondary schools. Outside of education, masters degree holders working in Physics are predominantly involved in Optics, Medical Physics and Acoustics. Bachelors degree holders have the lowest current involvement in Physics; besides secondary school education, they are primarily found working in Optics, Acoustics and Vacuum Science.

Those Ph. D. members who are not working in Physics are primarily engaged in related science fields; bachelors degree holders are primarily working in Engineering while masters degree holders are rather evenly split between related science and engineering fields. The mix of Engineering and related science work fields is remarkably similar at each degree level as was illustrated in Fig. 8.

Professional Self-Identification

When one examines the employment of society members in further detail, it becomes clear that a relationship exists between subfield of work and professional self-identification, as illustrated for selected areas in Fig. 9. All but a few of the individuals working in Elementary Particles, Nuclear Physics, Low Temperature Physics, Plasma and Solid State Physics consider themselves physicists, as do ninety percent or more of those in an additional five Physics subfields. While most of the society members who are working in Atomic and Molecular Physics and Biophysics consider themselves physicists, some also consider themselves chemists, and in the case of Biophysics, also biologists.

Similarly, while the majority of those working in Electromagnetism Electronics, Optics and Fluid Dynamics consider themselves physicists, a notable number also consider themselves engineers. In many areas where society members are working, Physics is not the primary identification. In Acoustics and Vacuum Science there is a heavy mixture of engineers, as, expectedly, there is in the varied engineering areas. In High Polymer Physics, Chemical Physics and Crystallography, we find a high proportion of individuals identify-



EP	Elementary Particles	NP	Nuclear Physics
A&M	Atomic & Molecular Physics	El	Electronic Physics
Op	Optics	SE	Systems Engineering
Ac	Acoustics	HP	High Polymer Physics
MS	Materials Science	VS	Vacuum Science
EEE	Electrical & Electronic Engineering	CS	Computer Science
ChE	Chemical Engineering	Crys	Crystallography

FIG. 9. Selected fields and subfields by professional self-identification, 1981. The points in the equilateral triangle above illustrate the proportion of members working in selected subfields who identify themselves as physicists/astronomers, other scientists, and engineers. Thus, Nuclear Physics (NP) and Elementary Particles (EP) are dominated by physicists. In contrast Acoustics (Ac) has approximately 15% other scientists and the remainder evenly split between physicists and engineers.

ing themselves as chemists. The findings here complement the picture of interdependence among Physics, Engineering and related science fields presented in the following discussion of secondary subfields.

Secondary Subfields

While major concentration here has been on primary subfield of work, it should be noted that approximately three-quarters of the members also indicate a secondary subfield. The extent of this phenomena varies among the subfields. A majority of the members working in Elementary Particles and in Medical Physics note only that single subfield of work. Astronomy and Astrophysics frequently combine as primary and secondary subfields of work. Thus, nearly two-thirds of those working in Astronomy are working only in that field or in Astronomy and Astrophysics. Similarly, 60% of those working in Astrophysics are working in Astrophysics only, or in Astrophysics and Astronomy. One-third of the members working in Plasmas, Nuclear Physics and Physics Education indicate only a single subfield as do over one-third of those working in Psychology. For most other subfields, there are a constellation of secondary subfields which provide a more detailed picture of the type of work individuals employed in these areas are actually doing. Looking at some of the larger subfields, we note that among members working in Atomic and Molecular Physics who provide a secondary subfield, the major ones cited are Chemical Physics and Optics. Similarly, among those working in Chemical Physics who provide a secondary subfield, Atomic and Molecular Physics, Chemistry and Solid State Physics are most frequently cited. For the many Solid State members who provide a secondary subfield, Materials Science, Low Temperature Physics and Optics are the major areas. Figure 10 illustrates some of the relations between primary and secondary subfields for selected areas.

Complementary patterns can be found for those primarily working outside of Physics. More than three-quarters of those members working in Electronic Engineering provide a secondary subfield: Solid State Physics, Acoustics and Optics are predominant. Of those working in Chemistry, 80% provide a secondary subfield: primarily Chemical Physics, Crystallography and Materials Science.

Although the numbers are small, the constellation of secondary subfields surrounding the smaller subfields are also revealing (see Appendix C). The close relationship between Physics and related Science and Engineering fields grows increasingly apparent. This multiple subfield pattern is particularly predominant in industrial and other nonacademic employment.

Mobility

Despite the blurred edges between many fields and subfields of science, there has been marked outmobility from many of the major Physics degree subfields, and inmobility into a number of the more applied and interdisciplinary physics areas. Nuclear Physics, again, shows the greatest outmobility between field of degree and field of work. More than twice as many people received degrees in Nuclear Physics and Low Temperature Physics as are currently working in these areas. As Table 1 indicates, there has also been significant departure from the degree fields of Elementary Particles, Solid State, Mathematical Physics and Atomic and Molecular Physics.

On the other hand, there has been marked inmobility of people trained in other subfields into Medical Physics, Acoustics, Optics, Geophysics and Fluid

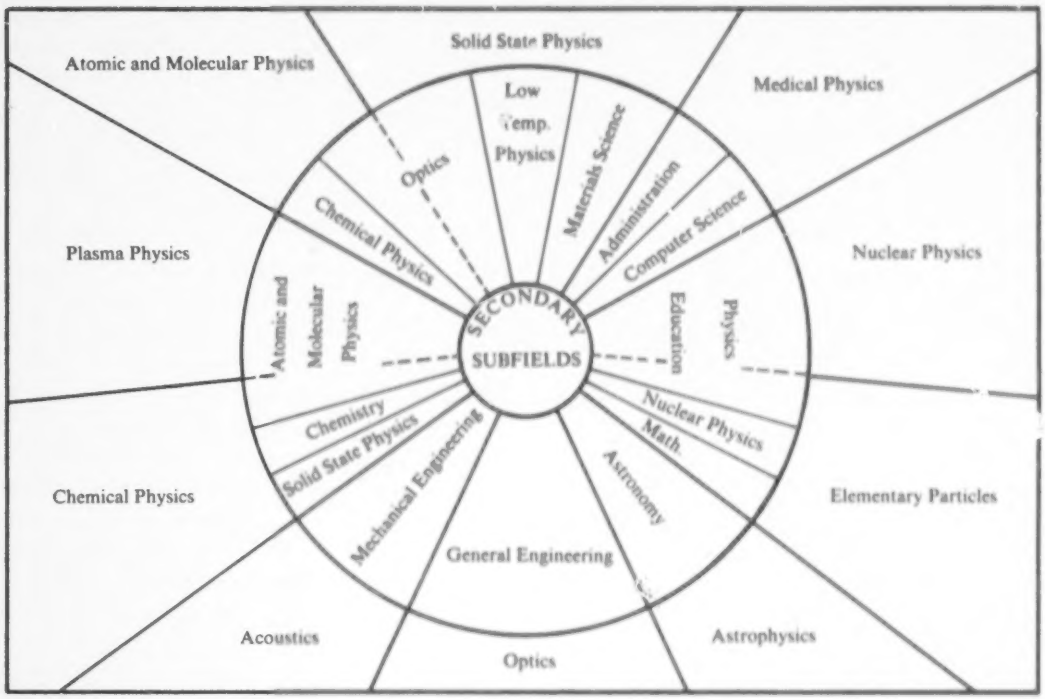


FIG. 10. Work subfield configurations, 1981. Primary subfields are in outer portions and secondary subfields are within the circle.

Dynamics. Figure 11 elaborates on some of these mobility paths between degree and work in greater detail. The mobility noted here, of course, may have occurred at different points of time. Much of the mobility into Acoustics appears to have occurred in the past; Medical Physics, although still a growing subfield, does not appear to have as much inmobility as it did a few years ago, while Optics and Fluid Dynamics continue to receive a heavy input of workers originally trained in other areas.

TABLE 1. Major subfields of net outmobility and inmobility between degree and current work, 1981.

Selected Subfields	Percent Change Degree/Work	Degree N.	Work N.
Net Outmobility			
Nuclear Physics	− 63	512	190
Low Temperature Physics	− 61	113	44
Elementary Particles and Fields	− 44	318	178
Solid State Physics	− 44	649	367
Mathematical Physics	− 40	87	52
Atomic and Molecular Physics	− 38	248	155
Net Inmobility			
Medical Physics	+ 121	75	166
Acoustics	+ 99	81	161
Optics	+ 68	172	289
Geophysics	+ 5	3	54
Fluid Dynamics	+ 50	34	51

Postdoctoral Positions

Approximately 6% of the Ph. D. members of AIP member societies were holding postdoctoral positions in 1981. This is quite comparable to the figure the National Academy of Sciences found among physicists in 1979, but somewhat lower than the 9% figure in 1973.[1] One-tenth of these postdocs were women, one-fifth were foreign citizens and one-third were more than three years beyond the Ph. D. In contrast to 1973, this represented a considerably higher proportion of women among postdocs by a factor of 2, and a somewhat higher proportion of foreign citizens and older Ph. D.'s. Postdoctoral positions have frequently been viewed as an overlapping mixture of employment, advanced research training, and preparation for entree into new areas.

Clearly the postdocs among the membership consider themselves employed! More than 80% of the society members holding postdoctoral positions are continuing research in Physics and Astronomy. Three-quarters are working full-time in universities while the re-

[1] **Postdoctoral Appointments and Disappointments**, NAS 1981 and **Postdoctoral Positions in Physics and Astronomy**, AIP R-270. Both NAS and AIP came up with a 9% figure for 1973, although definitions and methodology were not fully comparable.

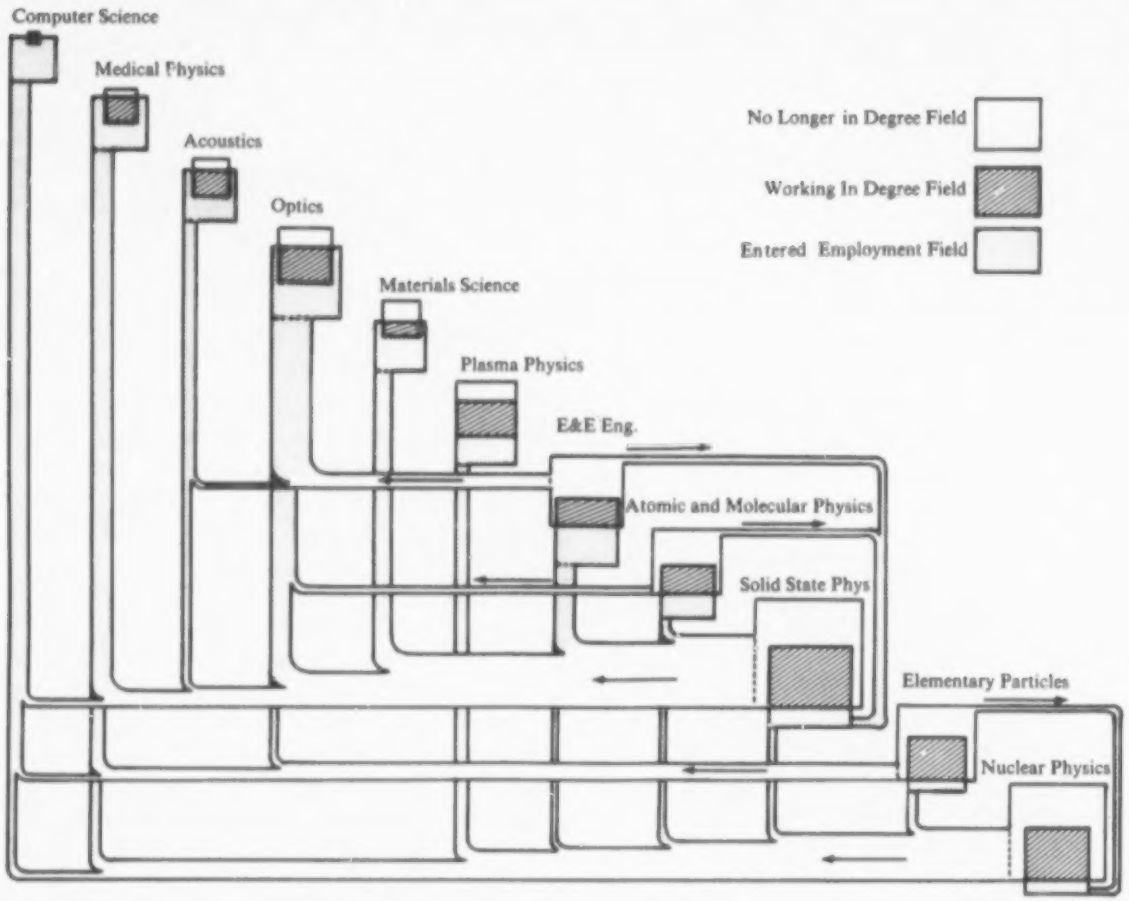


FIG. 11. Dominant subfield mobility paths, 1981. This figure illustrates dominant movement patterns between selected subfields of degree and work, with the size of the boxes representing the number of members in each subfield. For example, members who received their highest degree in Atomic and Molecular Physics (A&M), but are no longer working in that subfield (light area), often moved into Solid State Physics or Optics. The area shaded with diagonal lines represents individuals who received their degree and are still working in A&M. Members who are working in A&M but did not receive a degree in that field (dark area), typically received degrees in either Solid State Physics or Nuclear Physics. Degree fields with no dominant outmobility paths reflect diffuse movement in other fields of work.

mainder can be found in FFR&DC's, industry and government. Two-thirds of the postdocs are working in nine Physics and Astronomy subfields. By size they are: Elementary Particles, Astrophysics, Astronomy, Solid State Physics, Nuclear Physics, Plasma Physics, Chemical Physics, Biophysics, and Atomic and Molecular Physics.

Many postdocs are continuing research in their dissertation subfields; thus, virtually all of the postdoctoral positions in Elementary Particles and Astronomy were held by Ph. D.'s with previous training in these areas or Astrophysics. Over 80% of those doing postdoctoral research in Solid State, Nuclear Physics, Plasmas and Astrophysics were also Ph. D.'s originally trained in the same subfield, with only minor inmobility from other Physics subfields.

To what extent this continuing pattern of research in one's own dissertation subfield reflects necessary advanced training or the temporary holding pattern typical of the mid-1970's is difficult to determine.[1] The few entry level academic staff positions in traditional Physics at research-oriented universities still frequently call for a good postdoctoral background. All postdocs, however, will not be obtaining such positions. Unlike the mid-1970's, the postdocs today are more likely to

[1]See "Postdoctoral Appointments & Disappointments" NAS 1981 and "Transition—A Follow-Up Study of 1973 Postdoctorals" APS, 1979.

be aware of their limited academic chances. Whatever the specific rationale, most of these postdocs appeared to be following the classical pattern of using the postdoctoral position to gain advanced research experience or, at least, more time in their chosen dissertation areas.

In contrast to the above pattern, some postdocs appeared to be using their positions primarily to develop new skills or to utilize their skills in new areas. Thus, society members holding postdoctoral positions in Chemical Physics, Biophysics and such other fields of science as Biology and Chemistry have frequently not had previous Ph. D. training in these areas.

The Self-Employed

The self-employed, who have been grouped together with industry in the previous employment discussion, make up a very small proportion of the membership population, slightly more than 2%.[1] However, they are a group in which considerable interest has been shown, but about whom little has been known. With few exceptions they are male. Somewhat less than half of them are Ph. D.'s, slightly over one-fourth masters and one-fourth bachelors or other degree holders. This is in strong contrast to the overall membership, where Ph. D.'s predominate and relatively few nonstudent bachelors are represented. One-quarter of the self-employed are working part-time. Most of this small group, with a median age of 61, are clustered just prior to or after the formal retirement age of 65. On the other hand, the three-quarters of the self-employed who are working full-time have a median age of 48, about 6 years older than other full-time employed members. As Fig. 12 illustrates, these self-employed members are broadly distributed over the age structure.

Although many of the self-employed were originally trained in Physics, almost half are currently working outside of Physics in related engineering, science and professional fields. This again is in contrast to the overall membership population, two-thirds of whom are working in Physics. Those self-employed who are working in Physics are most predominantly found in Acoustics, Optics and Medical Physics. While most of those working in Optics were originally trained in Optics, those working in Acoustics, Medical Physics and a smattering of other Physics subfields were originally trained in a much broader variety of areas. In terms of actual work activity, the self-employed are primarily engaged in development, design and engineering, consulting[2] and applied research. The few who are working in administration, along with some of those engaged in the previously noted work activities, are often heads of their own companies. While this phenomenon is too minor to be explored here, it is projected (by the Bureau of Labor Statistics) that small scientific consulting firms will be the high-growth employment sector in the 1980's.

Canadians

In the total 1981 AIP society membership, approximately 2000 (over 3% of all members) resided in Canada. Although their representation in the current sample is relatively small, some comments can be made about their characteristics. Canadian society members are somewhat younger than U. S. members and are significantly more likely to have a Ph. D. (nearly 80%), and to be employed in more traditional Physics areas than their U. S. counterparts. Slightly more than 3/4 of the Canadian members were working in Physics or Astronomy subfields and identified themselves as physicists or astronomers. In addition, over half of the Canadians have university positions compared to only 35% of the U. S. members. These employment patterns reflect the likelihood that industrially employed engineers, chemists and other scientists are probably neither strongly attracted to nor heavily solicited by professional societies based in another country. It is

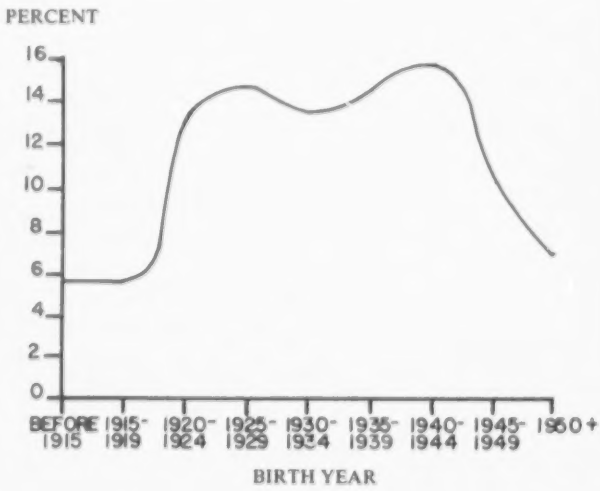


FIG. 12. Birth year distribution for the full-time self-employed, 1981.

[1]Students are excluded in this discussion.

[2]While consulting was not one of the specified work activity options, it was noted by many who checked off "other work activity." It has been incorporated as a specified work activity in the 1982 survey.

reasonable to assume that society members residing in other foreign countries (approximately 12% of all society members) are also predominantly physicists or astronomers working primarily in academic settings.

Women

Nearly 6% of all society members are women. Part-time employment is more prevalent among them than among men (11% and 4% respectively). Women are less likely than men to work in industry and more likely than men to work in the academic sectors, with the largest difference appearing in secondary schools. Within industry, women are less likely than men to work in physics subfields and more likely to work in the related sciences, most notably Computer Science. They are also less likely than men to be engaged in developmental work. In both academe and industry, women are underrepresented in administrative positions.

The following discussion is based on full-time employed women in university and college settings, the only subgroup large enough to afford a detailed analysis. Based on median age, women are 2 years younger than their male colleagues. They represent 9% of the youngest age cohort (36 and younger), but only 3% of the over-46 group. This difference in age distribution between women and men accounts, in part, for two striking phenomena. First, 11% of the entry level positions (assistant professor, lecturer, instructure and research associate) are filled by women, but they hold only 4% of the tenured professorial ranks (associate and full professor). Second, less than half of the women are tenured compared to over 2/3 of the men. When university and college employment is examined by age cohort, it becomes clear that it is more difficult for a woman to be promoted than a man. Within each of the age groups women are less likely than men to be in the tenured, professorial ranks and more likely to be in the nonprofessorial ranks. In addition, the median age of those women who do receive tenure is 4 years older than that for men. This appears to be strong evidence for the existence of sex discrimination in academe.

Salaries

1981 brought a tightening national economy and although inflation was slowly being curbed, interest rates spiraled upward and budgets were being cut. Unemployment, particularly in selected regions and industries, was severe and some individual companies, colleges and communities foundered. (The first six months of 1982 do not appear to have ameliorated the situations.)

Physicists, engineers and related scientists are hardly immune from such circumstances, but the effect in mid-1981 on society members was barely discernible, except in selected areas as the following discussion outlines. Whether this situation will continue to hold through 1982 remains to be seen.

Science and Engineering unemployment rates have, except in the very worst of times, been a poor indicator of the economic situation of scientists and engineers. In 1981, as in 1979, the unemployment rate hovered around 1%. Salary levels are, perhaps, more relevant indicators. In 1979, the median salary for full-time employed society members was about $28 000: between $19 000 and $24 000 in the academic sectors and about $31 000 outside of academe.[1] By 1981, the overall median salary had increased to about $35 000; median academic salaries ranged from $22 000 to $30 000 depending upon the type of educational institution.[2] Median nonacademic salaries, however, were close to $40 000. Except in secondary schools and government, the yearly percentage increase between 1979 and 1981 in median salaries has been above 12%. Secondary school salaries have experienced yearly increases of less than 8%. Most society members, thus, have just about kept in pace with inflation. However, as the above suggests, all groups have not been dealt with equally in terms of salary increases. The following section looks at salary levels in more detail. Such detailed information on salary variation and change is critical for understanding the effects of the economy on society members.

This initial discussion will look at salaries in 1981, and where possible, compare them to prior data. While this data is informative, it should be noted that it is gross cross-sectional data. The accumulating information from the longitudinal sample, discussed in the following section, should be more provocative, even though still based on small numbers. What happens to an individual's salary when he remains with the same employer, when he changes work activities? Results from the still small longitudinal sample are suggestive. Next year, when major longitudinal comparisons are possible, more reliable information on the changing economic situation of members should be available.

First, let's look at 1981 salaries. Variation in salaries is affected by several factors: type of employer, work activity, years of experience, level of highest degree, and sex. Women, in both academe and industry, receive lower salaries than men. Although the number of women in our sample remains small, the data suggest subtle differences in the factors affecting the salary dis-

[1] As noted in the Appendix, all salary data are based on the full-time employed.

[2] Canadian society members working in universities, the predominant employer type, received somewhat higher salaries than their counterparts in the U. S. (approximately $32 000 in U. S. dollars).

crepancies in these two dominant employment sectors. Women are a great deal less likely than men to hold tenured 9–10 month salary positions within universities and colleges; those who do earn virtually the same salary as their male colleagues. However, for 11–12 month salaries, there is a substantial difference, approximately $4000. As discussed in the earlier section on women society members, they are more likely than men to hold the lower prestige, nontenured, entry level academic ranks. These positions are typically on an 11–12 month salary base. Therefore, the question of equal opportunity for promotion and tenure is more serious than the salary differences within the various academic ranks.

Within industry, the overall salary differences between women and men are especially pronounced. This is in part due to the fact that the women employed by industry are 11 years younger than men. When age differences are controlled, the salary differential is reduced. However, while the youngest women earn just a few thousand dollars less than men, the income disparity grows with experience. This is in part the results of the different work activities in which women, in comparison to men, are engaged. Women, for example, are less likely than men to move into the highest paid work activity, administration. Therefore, within industry, salary differences between women and men also appear to be a reflection of the available career paths. Data collected during the next several years may afford a more detailed analysis of this phenomenon within industry.

Comparisons by degree level are also important. However, they are likely to be misleading since there are relatively few nonstudent lower degree holders among the members; those who do exist tend to be both somewhat older than the Ph. D.'s and, as discussed earlier, employed in quite different areas. The only employer type where comparisons between degree levels can be examined is industry; there, individuals with a mesh of different backgrounds can be found working.[1] As Table 2 indicates, Ph. D.'s working in industry receive median salaries about $5000 higher than their masters and bachelors degree colleagues. However, this differential is really somewhat greater than it appears on the surface since Ph. D.'s are younger than other degree holders working in industry. As Fig. 13 illustrates, when years from highest degree are taken into account, the differential between degree levels becomes more pronounced, $10 000 or more at each experience point. However, Fig. 14, which illustrates the median salaries of masters degree holders working in industry and secondary schools by years from highest degree, underscores one of the central problems facing the scientific community today.[2] While salary is hardly the sole reason for a physicist's choice of employer, such large salary differentials as exist between industrial and secondary school employment, at every experience level, must be considered as a major factor affecting initial employer choice and later employment mobility.[3]

The remainder of this salary discussion will concentrate on Ph. D.'s, who make up 3/4 of the full-time employed nonstudent society members. As Table 3 in-

TABLE 2. 1981 industrial[a] salaries by level of highest degree.

	Median Salary (in thousands of dollars)	Median Age	Total Number Known
Ph.D.	41.8	40	937
Masters	37.0	43	331
Bachelors	36.8	49	213

[a] Includes self-employed.

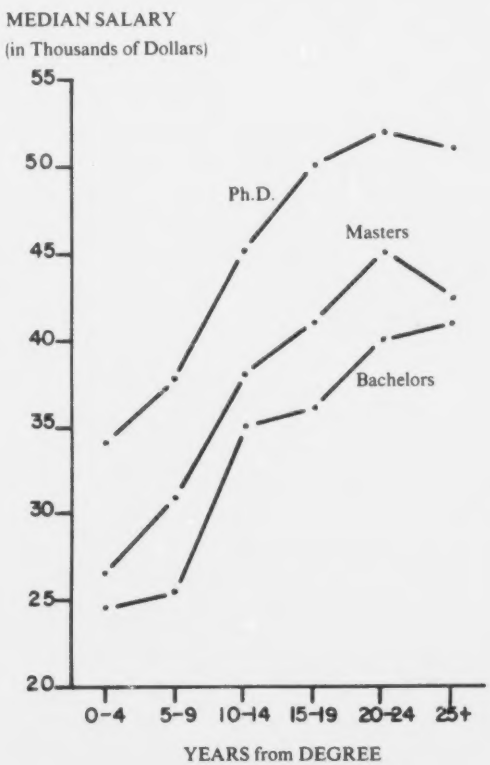


FIG. 13. 1981 median salaries by degree level and years from degree for industrially employed society members.

[1]Some mixture can be found in other areas, but our current sample is too small to examine salary patterns reliably.

[2]While bachelors degree holders also teach in the secondary schools, there are not a sufficient number of them in the membership sample to make meaningful comparisons.

[3]See employment mobility section, for further support.

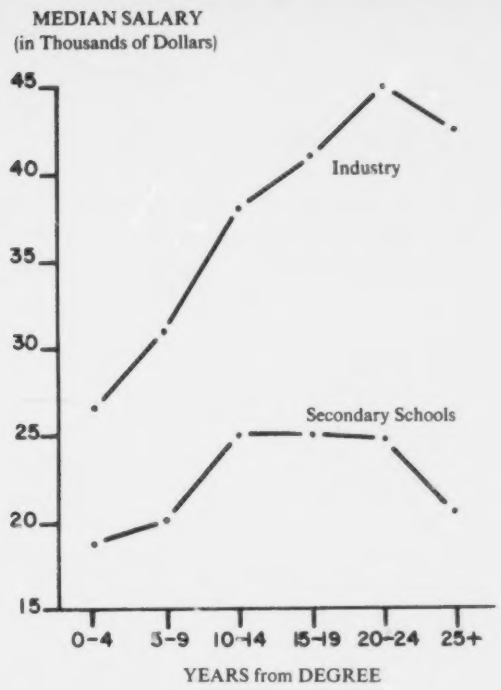


FIG. 14. 1981 median salaries in industry and secondary schools for masters degree holders by years from degree.

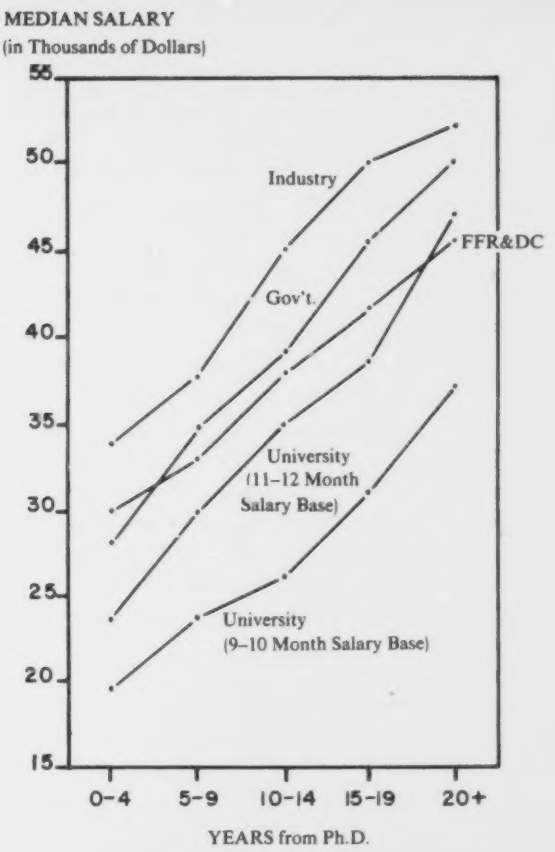


FIG. 15. 1981 median salaries for selected employer types by years from Ph. D., excluding postdocs.

dicates, Ph. D.'s salaries clearly vary by principal work activity, from $29 000 for those Ph. D.'s primarily engaged in teaching to $49 000 for those Ph. D.'s primarily engaged in administration. Society members working in research and development earn median salaries between these extremes, ranging from the mid-thirties to the low forties.

As indicated earlier in this section, overall salary differentials are greatest by type of employer. For Ph. D.'s this variability can best be explored by looking at experience curves. Figure 15 compares the median salaries of Ph. D.'s employed in universities, both on 9–10 month and 11–12 month salary bases, to those employed in industry, government and federally funded research and development centers. The difference between 9–10 month university salaries and industry is clearly the most striking at all experience levels. Those Ph. D.'s employed at FFR&DC's, although starting at a relatively high salary, have less marked salary increases in comparison to those working in other nonacademic areas.

Since there is variation in salaries, not only between, but within employer types, Figs. 16–20 present the median, quartile and decile salaries in the five major Ph. D. employer areas by years since the Ph. D.[1]

Industrial salaries, clearly higher at all years from the Ph. D. than salaries in other employment areas, also show the greatest variability, particularly as the years increase. This reflects the different career paths available in industry in addition to the broad diversity of companies in which society members are employed. After the first ten years of employment,the range in industrial salaries begins to expand. The very high salaries, reflected in the upper right in Fig. 16, represent

TABLE 3. 1981 salaries by principal work activity, Ph.D.'s.

Principal Work Activity	Median Salary (in thousands of dollars)	Median Age	Total Known Responses
Teaching	28.7	45	821
Basic Research	33.6	40	1043
Applied Research	38.0	39	805
Development	41.0	41	211
Design/Engineering	38.2	39	131
Administration	49.3	47	418
Other	40.5	41	117

[1]See Appendix E for explanation of quantiles. At any of the years from degree points illustrated, 90% fall below the top quantile, 75% below the next quantile, 50% below the median, 25% and 10% respectively below the lower quantiles.

scientists and engineers who have moved into general administration or who head their own companies. Members remaining in corporate research, development and engineering over the years typically have salaries falling below the median.

Each of the experience salary curves, by employer type, presents a quite different picture. The interquartile ranges (lightly shaded central portions of the figures) represent the typical salary range for each year from Ph. D. cohort. The interdecile ranges (outlined by the white areas) give a picture of salary extremes. University 9–10 month and FFR&DC salaries generally show the least variation, although clearly university salaries are consistently lower. The unique pattern observed among government salaries reflects the federal salary ceilings, which create a squeeze at the upper salary levels. Together these experience curves present a cross-sectional picture of salaries in different employer areas for Ph. D.'s at various stages in their careers. A later section in the report will deal more directly with current salary changes. (Full details for these and other salary distributions of interest, but not always commented on here, can be found in Appendix C.)

Society Membership, 1979–1981

The previous sections have highlighted the employment situation of society members in mid-1981. Where feasible, comparisons were made with data from 1979. While some shifts were observed, the overall structure remained relatively stable, as might be expected over a brief two-year period. Net changes are seldom dramatic; some gross changes appear to balance others, at least temporarily. The effect on the overall population is thus, at first, minor. The underlying dynamics of change, however, may be considerably more volatile. While what happened to society members between 1979 and 1981 may not have had a major impact on the 1981 profile, examination of these changes may provide portents for future shifts in the composition of society membership.

The major current dynamic elements in the membership system consist of new society members, stu-

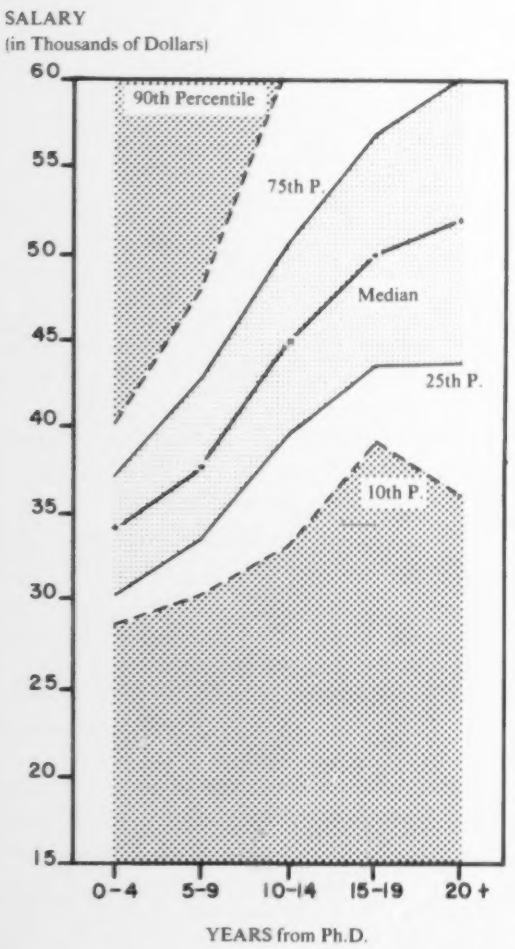


FIG. 16. 1981 salary structure in industry by years from Ph. D.

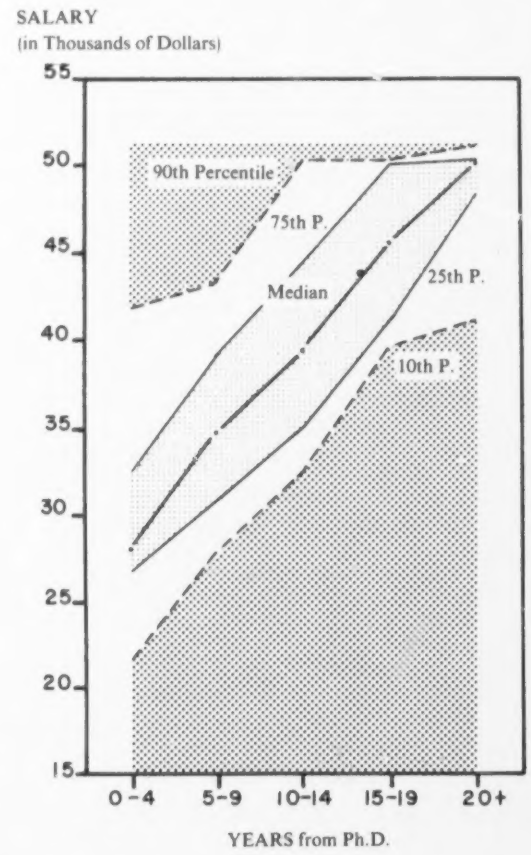


FIG. 17. 1981 salary structure in government by years from Ph. D.

dents—who are frequently on the verge of change—and those continuing members who have made major employment-related changes during the last two years. We may begin to gain a glimpse of ensuing changes by exploring each of these groups in further detail.

New Members, 1979–1980

In 1981, a random sample of new members, who had joined an AIP member society for the first time during 1979 and 1980, was also drawn to complement the random sample of continuing members.[1] It should be noted that the "new" members we are describing here are only one part of any given society's "new members." Some members add on additional societies after having been a member of one society for several years. Such individuals are, appropriately here, included among the continuing members.[2]

New society members are young; 56% of the new members were 31 years old or younger in contrast to only 10% of the continuing members. While part of this is due to the large student component among the new members, over one-fourth, part is also due to the fact that society members join at an early stage in their careers. The median age for the nonstudent new members, for example, is 33.6 in comparison to 43.6 for the continuing members.

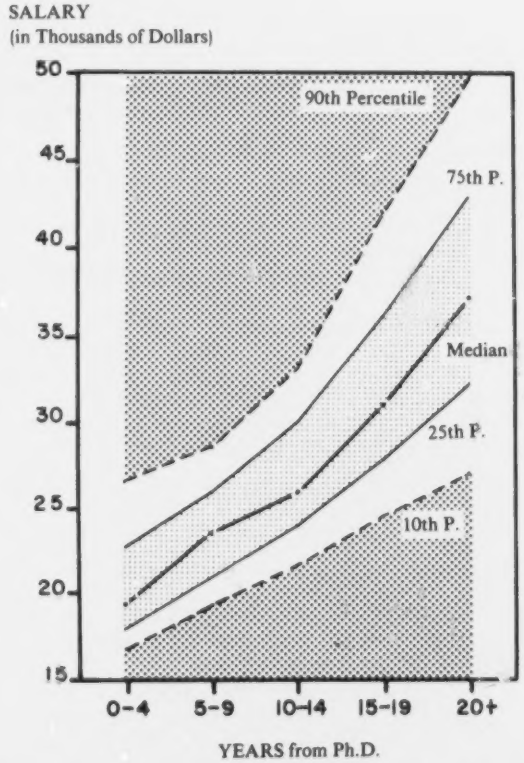


FIG. 18. 1981 salary structure in universities by years from Ph. D., 9–10 month salary base, postdocs excluded.

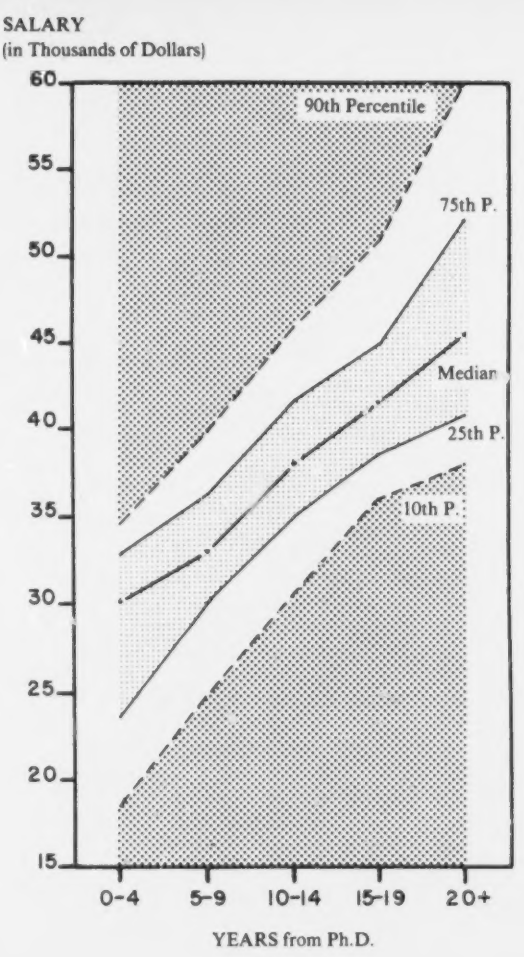


FIG. 19. 1981 salary structure in FFR&DC's by years from Ph. D.

The new members, even the nonstudent new members, were somewhat more likely to be lower-degree holders than the continuing members, over one-third in contrast to less than one-quarter respectively (This does not contradict the earlier finding of an increased proportion of Ph. D.'s among the 1981 versus the 1979 membership, since between 1979 and 1981 a number of the advanced graduate students obtained their Ph. D.'s.) Among the new Ph. D. members, nearly one-fourth were postdocs in contrast to less than five percent of the continuing members. Among the new members, there was also a slightly higher proportion of women, 10% in contrast to 5% among the continuing

[1]While some technical problems were encountered in selecting "new" members, they were clarified before analysis and have a minor effect on any of the current discussion. See Methodology section.

[2]While this method of dealing with "new" members does not affect the present discussion, it should be kept in mind when the individual societies are discussed. The extent and nature of new multiple society membership is just beginning to be explored and will be dealt with further next year.

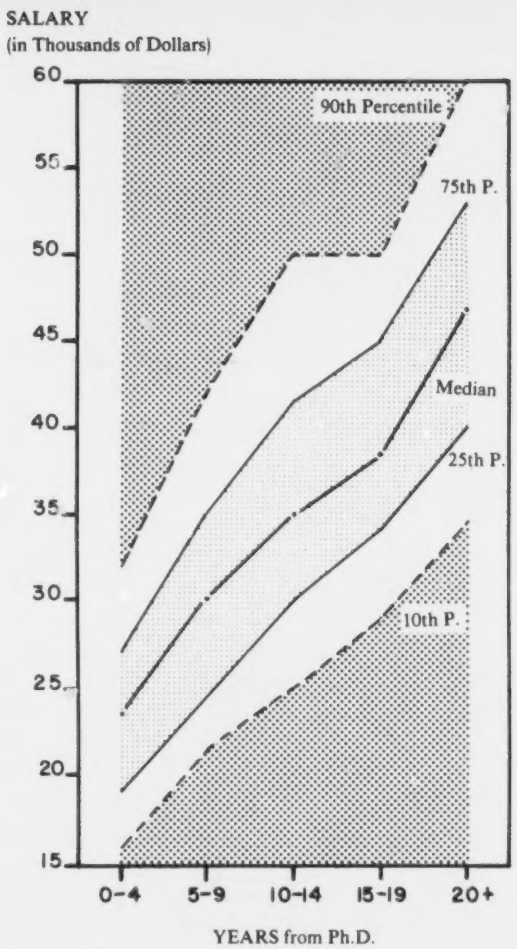


FIG. 20. 1981 salary structure in universities by years from Ph. D., 11–12 month salary base, postdocs excluded.

members, and foreign citizens, 16% in contrast to 5%. There was no change in the representation of U. S. minority groups.

Due to the high graduate student component among new members, they are more likely to be part-time or not employed and less likely to be full-time employed or retired than continuing members. As might be expected, they also have a somewhat higher unemployment rate, 3.1 in contrast to 0.8 for the continuing members. While continuing members are still predominantly physicists (59%), less than half of the new members identify themselves as physicists. In contrast, they are more likely to consider themselves engineers, chemists and other professionals.

Both new and continuing members are split, 45% versus 55%, between academic and nonacademic employment. There are, however, differences within each of the major sectors. New members are slightly less likely than the continuing members to be employed by universities, and somewhat more likely than the continuing members to be teaching at the secondary school level. The latter pattern probably reflects AAPT's efforts to attract more secondary school teachers into its membership, rather than any real growth in this employment sector.

Outside of academe there are major compositional differences between new and continuing members: 40% of the new members are employed by industry, in contrast to only 31% of the continuing members. Government and federal laboratory employees are less likely to be represented among the new members as Fig. 21 illustrates.

In earlier discussions we elaborated on subfield composition and mobility. The input of new members into various fields and subfields throws further light onto the shifting subfield composition of the membership. Among new members, Optics is as predominant a subfield as Solid State Physics, while Nuclear Physics is underrepresented. Even more telling is the proportion of individuals working in each subfield who became new members during 1979 and 1980. These proportions provide one indicator of current high and low growth areas within the membership. While approximately ten percent of the employed members with known subfields were new members, there were some notable departures by subfield. Areas experiencing a high input of new members were Chemical Engineering, Vacuum Science, High Polymer Physics, Low Temperature Physics, Psychology, Secondary School Physics, Chemical Physics, Optics and Chemistry. Several other, mainly applied and interdisciplinary areas, are also well above the overall ten percent mark.

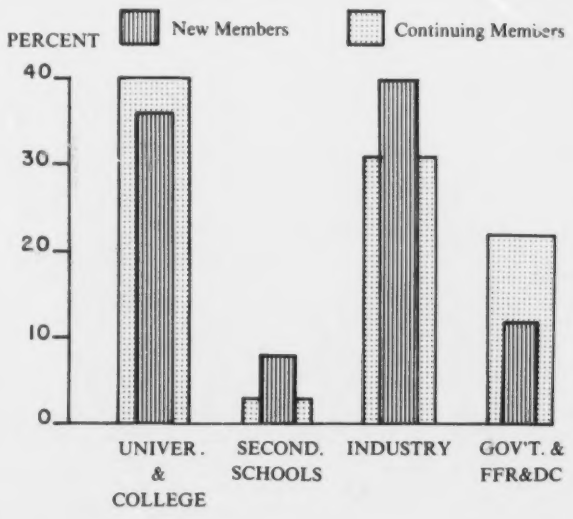


FIG. 21. Type of employer for new and continuing society members, 1981.

On the other side, entrance into the varied administrative subfield areas is lowest among new members, as would be expected from such a young group. The entrance into Nuclear Physics, Electromagnetism, Plasma Physics and several of the Engineering subfields is also low. Part of this reflects declining fields of employment for new young members while some reflects the timing of mobility. Computer Science, for example, is a rapidly growing field. But society members frequently move into Computer Science after they have been members working in one of the other Physics and Engineering subfields. Direct entry of new members from Computer Science thus remains relatively low.

New members clearly reflect a vibrant picture of their own; they do not in themselves explain the dynamics of change in membership composition, but they are central to any understanding. Tracing the patterns of new membership over several years should provide us with a fuller picture of one of the components of the underlying dynamics of society membership composition.

Student members of the societies, discussed in the next section, are found heavily among the new, but also among the continuing members. They are a particularly volatile group. Frequently trained in traditional Physics, they are also at high risk for outmobility to other subfields and fields as well as from society membership. They are a second, partly overlapping, element in the dynamics of society membership change.

Students

Student members (excluding those belonging only to the Society of Physics Students) represent over 8% of all society membership. The median age of these student members is 27 and nearly 3/4 received their last degree in a Physics or Astronomy subfield. The distribution of professional self-identification among students illustrates several features of the changing professional makeup of society membership. The proportion of students identifying themselves as physicists or astronomers closely tracks the proportion of the overall membership with those identifications (approximately 58%). These proportions, however, are slowly declining among both the student and nonstudent members. Chemists and other scientists are overrepresented among student members and these professions exhibit an increase in the overall membership. Engineers tend to join after attaining their highest degree and thus are underrepresented among student members. However, engineers comprise a large proportion of nonstudent new members.

Employment Changes, 1979–1981

The 1981 survey marked the second annual follow-up of the original 1979 sample of society members. Although comparatively few individuals have reported employment-related changes in any one year, the cumulative patterns that begin to emerge after two years are illustrative of scientific career development. In addition, these patterns suggest the way society members are responding to changes in the scientific labor market. Although employment-related changes are most likely to occur among younger society members, the distribution of median ages for the different work-related changes (see Table 4) is indicative of the sequential nature of career development patterns. The following discussion will focus on the relationship between these types of changes and the points at which they occur during a professional career.

Clearly, the first step in a professional career is the attainment of an appropriate degree. More than half of the students from our original 1979 sample had earned a Ph. D. by 1981. As expected, then, individuals receiving an advanced degree are the youngest of the groups reporting a change (median age 30). Changes in employment status can occur at a variety of points during a professional career. However, they most frequently occur with graduation or retirement. Thus, the combination of these two groups, recent graduates and retirees, accounts for the somewhat older median age of those reporting a change in employment status compared to a change in degree level.

Mobility between employers was the most frequently reported change. More than one in six society members changed employers between 1979 and 1981. Most of these individuals also changed *type* of employer. The latter typically occurs within the first 9 years after highest degree. The net effect of employer type mobility was a shift away from universities (7% decline) and into industry (16% increase). This shift largely involves recent graduates, and young, often untenured, faculty. In contrast, the members changing employers, but remaining within the same employ-

TABLE 4. Rates of employment related changes, 1979–1981.[a]

	Percent Reporting Change 1979–1981	Median Age for Changers
Employer	17	35
Primary Work Activity	14	38
Academic Rank	13	37
Primary Work Subfield	12	38
Employer Type	11	34
Tenure Status	9	35
Employment Status	6	32
Highest Degree	5	30
Professional Self-Identification	4	36

[a] Employment Status, Highest Degree and Professional Self-Identification are based on all respondents in 1979 and 1981. All other employment related changes are based on respondents who were full or part-time employed in 1981.

ment sector, tend to be slightly older. It should be noted that those members, who made atypical employer type changes, e.g., from industry into universities, usually did so during their mid-40's.

The shift in employer type is reflected in the changes in work activity, the second most common change. Predominantly academic work activities, teaching and basic research, suffered a net decline, while predominantly industrial work activities, development, design, engineering and applied research, exhibited a marked net increase. It should be noted that members who moved into administrative positions did so in their 40's. This, in part, accounts for the relatively high median age (38) for individuals making work activity changes.

Field and subfield mobility was reported by approximately one in eight society members during the last 2 years. The fields with the largest net inmobility were Computer Science, Electrical and Electronic Engineering, Nonscience, Optics and General Physics (see Fig. 22). The latter is an often used classification by physicists shortly after moving into industry. The subfields with the largest net outmobility were Nuclear Physics, Astrophysics, Chemical Physics and Physics Education on the university and college level. Subfield mobility occurred somewhat less often than work activity shifts, however, both were reported by the oldest group of members making a change. This suggests that both subfields and work activity shifts may be pervasive throughout a professional career.

Although professional self-identification is the least likely to change among the major employment-related

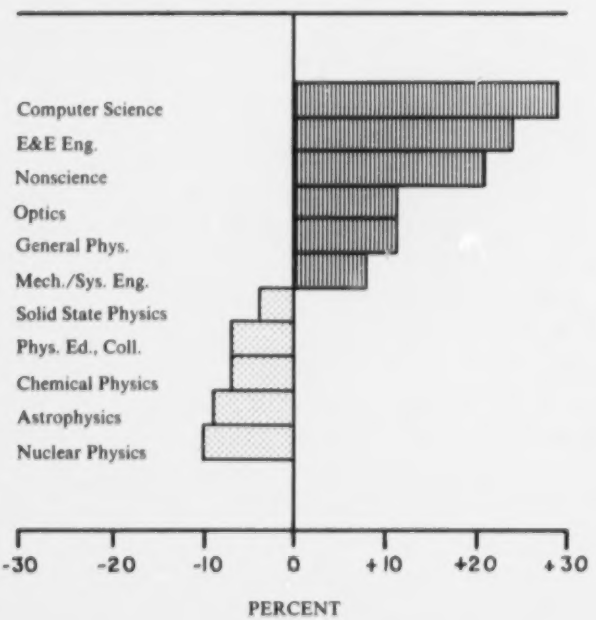


FIG. 22. Fields and subfields of major net change, 1979–1981.

characteristics, it is a source of both intense interest and concern. Changes in professional self-identification appear to indicate a dramatic change in career direction rather than the gradual shifts in emphasis suggested by many other work-related changes. The net effect of professional identification change over the last 2 years was a decline in physicists and astronomers (3% and 4% respectively), with a reciprocal increase in engineers (4%). This overall mobility pattern is indicative of changing labor force demands. However, it also suggests that physicists and astronomers are more versatile than other professionals. Graduate training in Physics apparently provides skills that are applicable in a variety of scienfitic careers. In contrast, it is rare for engineers and other scientists to change their professional identification to physicist. This suggests that training in other professions is not readily transferable into a Physics career.

An in-depth analysis of professional identification change demonstrates a strong relationship between this phenomenon and changes in employer or primary subfield of work. Approximately 20% of the society members who changed both employers and subfield, also changed professional identification. Recent Ph. D.'s exhibit a similar pattern. Over 8% of the members who earned their degree over the last two years, changed their professional self-identification concurrent with accepting their first professional position. These data contrast with a base rate of only 4% change in self-identification in the overall respondent group. More striking, however, is the fact that every individual who changed professional identification also changed either employer or subfield in the same or previous year. The long term impact of these changes on the professional composition of societies will continue to be monitored in future years.

Salary Increases, 1979–1981

The salary increases for the major employment sectors depicted in Fig. 23 are based on those society members who did not change employers between 1979 and 1981. The data for these individuals most accurately reflect actual salary increases. As noted earlier, most individuals who changed employers also changed employer type. Thus, their salary changes are strongly influenced by the substantial differences in salary levels between the various employment sectors. Within most employer types, salaries increased $6–9000 between 1979 and 1981, with nonacademic salary changes in the upper half of that range and academic salary changes in the lower half of that range. There are, however, two notable exceptions. Individuals employed by nonprofit institutions, typically university-affiliated

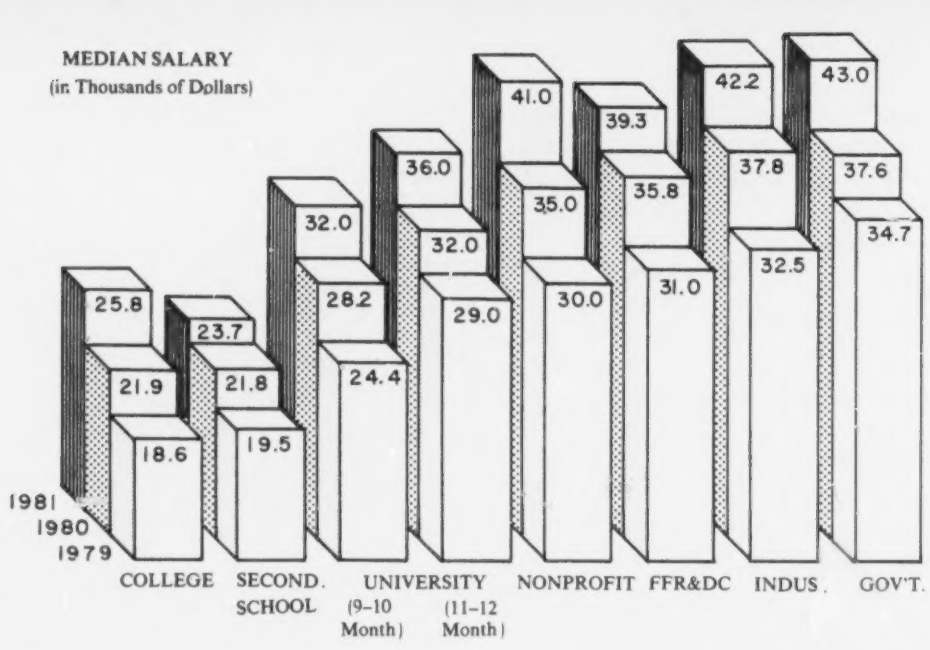


FIG. 23. 1979, 1980 and 1981 median salaries by employer type.

hospitals, received nearly $11 000 more in 1981 than in 1979. In sharp contrast, secondary school teachers earned both the lowest salary level in 1981 (less than $24 000) and the smallest salary increase between 1979 and 1981 (somewhat over $4 000). Industry and government remained the two highest paid employment sectors, with salary increases over $9000 for the 2 year period.

Despite the small number of women in the longitudinal sample, there were enough respondents to permit several general salary comparisons within major employment sectors. Salary increases for nonacademically employed women kept pace with men. Both received approximately $8500 more in 1981 than in 1979. However, academically employed women did not fare nearly as well. Women received less than $4000 in increases over the 2 years, while men received nearly $7000. Thus, the disparity in academic salaries between men and women actually increased. In part, the differential increases are due to the overrepresentation of women in secondary schools, the lowest paying employment sector. However, a related reason for the low salary increases is the type of academic positions held by women. As noted earlier, women are frequently held in lower-paying research associate, lecturer and instructor posts, while men are more likely to be promoted into the tenured, higher-paying, professorial ranks.

Overall salary increments were affected by work activity as well as type of employer. Members engaged in applied research, the youngest group, received the highest salary increases, nearly $10 000 over the 2 years. In contrast, members whose primary work activity was teaching received the lowest salary increase, only $6000. Administration, employing the oldest group of society members, commanded the highest salary level with an increase of slightly over $9000. Due to a 2½ fold increase in the size of the longitudinal sample in 1982, a more detailed analysis of salary increases will be possible in next year's report.

Employment and Salary Change, 1979—1981

Approximately one in six society members changed employers between 1979 and 1981. Most of these individuals also changed employer type. Those members changing employment sector were rewarded with substantial salary increases. In comparison, members who changed employers within the same employment sector received salary increments that closely tracked the increases received by those who did not change employers. Members who changed employers within industry received salary increases somewhat higher than those who continued with the same industrial employer ($10 500 and $9500 respectively). Members changing university employers received salary increases comparable to those who did not change universities, approximately $7000 over the 2 years. The former, however, were younger faculty members earning salaries in 1979 that were well below the median for universities. Thus, they effectively received somewhat higher percentage increases than members remaining with the same university employer.

Most of the mobility patterns between employment sectors were too diffuse to analyze, with the exception of the dominant move from university to industry. The society members making the latter change between 1979 and 1981 literally doubled their salaries. It should be noted, however, that these individuals were often moving out of postdoc positions, thus, they had received very low salaries in 1979. Recent Ph. D.'s also did very well financially. Respondents who were advanced graduate students in 1979 and earned their Ph. D.'s within the next two years, received a median salary of nearly $30 000 in 1981. This high starting salary reflects the fact that over half of the recent Ph. D.'s accepted positions in industry. It is clear, then, that industry is attracting, with high salaries and good opportunities for advancement, increasing numbers of recent Ph. D.'s, as well as young, often untenured, faculty members.

The second most commonly reported change was in work activity. Mobility from the predominantly academic work activities, teaching and basic research, into more applied areas was reported twice as often as the reverse shift. Members who made the former change received approximately $14 000 more in 1981 than in 1979. These salary changes closely resemble those described earlier for members moving from universities into industry. Members, who worked in the broad applied areas in both 1979 and 1981, but changed specific work activities, received salary increases comparable to those described for mobility within industry, approximately $10 000 over the 2 years. Members who left teaching or basic research for administrative positions in either academe or nonacademe received salary increases of approximately $11 000. The latter group was the oldest among those reporting a change in work activity. The similarities noted between salary structures for work activity and employer type reflect the considerable overlap between the two.

Geographic Mobility, 1980–1981

When society members changed employers, they frequently made major geographic moves within the U. S., at times over quite long distances.[1] There was also minimal movement from the U. S. to countries abroad during 1981 (less than 0.5%); this movement was virtually balanced by the number of members entering the U. S. over the same period. The following discussion focuses on interregional mobility within the U. S. Overall, approximately 4% of the membership changed geographic regions during 1981 (see Table 5).

TABLE 5. Regional mobility of all society members during 1981.[a]

Region[b]	Net Change %	Inmobility %	Outmobility %	Total Number in 1980
New England	− 0.5	4.0	4.5	5 139
Middle Atlantic	− 0.5	3.4	3.9	10 049
South Atlantic	+ 1.1	4.8	3.7	7 507
East North Central	− 1.8	3.5	5.3	6 609
East South Central	− 0.3	4.1	4.4	1 448
West North Central	− 1.9	4.2	6.1	2 059
West South Central	+ 1.2	6.6	5 4	2 562
Mountain	+ 2.2	7.2	5.0	3 573
Pacific	+ 0.5	4.0	3.5	9 864
Overall		4.3	4.3	48 810

[a] Mobility rates were calculated on differences in address files between 12/31/80 and 12/31/81.
[b] See Appendix X. for listing of states by region.

Students, 3 times more likely to move between regions than nonstudent members, generally did so to accept their first post-degree position. The differences in the number of individuals entering and leaving each region may be viewed as an indicator of the scientific employment opportunities within that region.

The prevalence of interregional mobility varied widely by both region of origin and region of destination. The midwest (North Central and West South Central) had outmobility rates higher than the national average, while comparatively few members left the states along either coast. Conversely, the Middle Atantic and East North Central states had the lowest inmobility rates, while relatively large numbers entered the Mountain and West South Central states. The effect of these interregional moves was a marked growth in the sunbelt states (Mountain, West South Central and South Atlantic), and an appreciable decline in the North Central states (West North Central and East North Central). The dominant net exchange routes (largest differences in the number of scientists moving between two regions) are illustrated in Fig. 24. The majority of these high net exchange routes was between adjoining regions. There were two general patterns: members from the North East moved to the South Atlantic and members from the northern states moved to the west and southwest. The only long distance moves were from the Middle Atlantic and East North Central to the west coast and southwest. These net shifts in region of residence reflect the continued growth of high tech. industries in the sunbelt and the serious economic difficulties of many employment sectors in the northern states.

Although the net exchange between regions provides an accurate picture of the effects of population shifts, it does mask several underlying dynamics. To analyze these dynamics in detail, a preference index for

[1] See Appendix B for listing of states within each region.

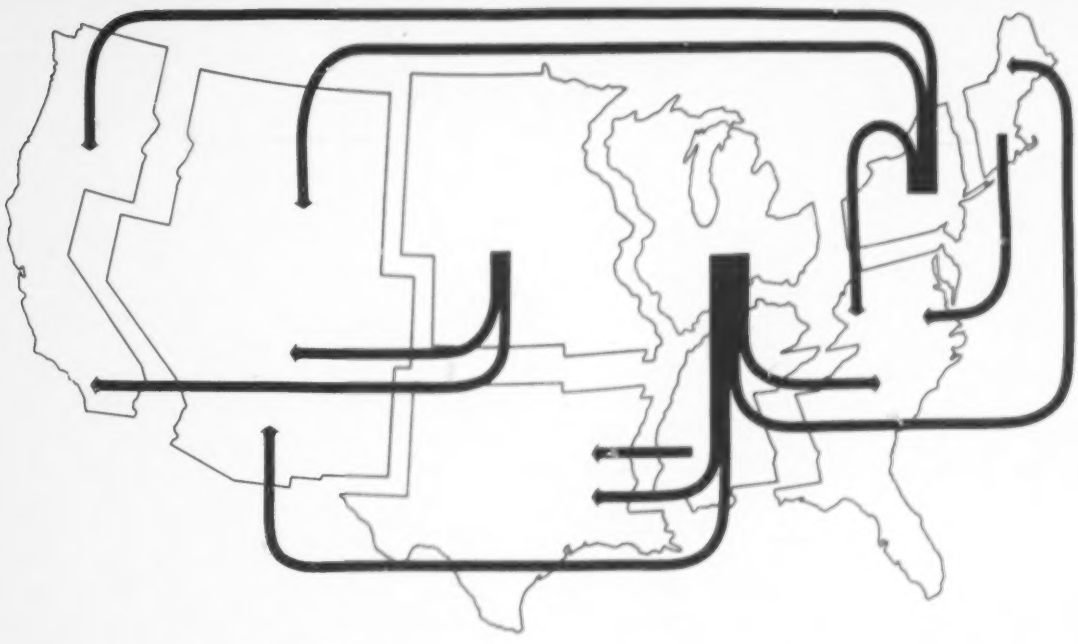


FIG. 24. Major interregional net exchange routes during 1981.

interregional mobility was calculated.[1] This index compares observed mobility with expected mobility, taking into account the national average mobility rate as well as differences in the population of both the region of origin and the region of destination. The results of this analysis highlight an interesting pattern. As noted in Fig. 24, there was no appreciable difference in the number of society members moving between the West South Central and Mountain, or the Mountain and Pacific regions. However, this balance was the result of equally large numbers of members moving in both directions between these regions. This is additional support for the existence of a good job market for scientists in the southwest portion of the U. S. and suggests that society members are moving freely to adjoining regions within this area in order to further their careers.

The pattern of mobility in the southwest contrasts markedly with movement between the East South Central and New England states. Once again, there was no net difference in the number of individuals who migrated in either direction. However, the size of the movement was significantly smaller than expected. This was due in part to the relatively long distance between these regions. However, it also reflects the tight job market in both regions.

Comparisons of Society Members

Members of the nine AIP member societies have many comon scientific and technological concerns, both in Physics and related disciplines. The societies also exhibit some overlapping membership, as indicated in Table 6. The overlap between APS and AAPT is particularly strong; however, it should be noted that, with the exception of ASA, all of the societies have a fairly significant overlap with APS. There is also some other minor overlapping membership between societies, primarily involving AAPT and OSA.

The characteristics of individuals who belong to more than one of the AIP member societies are of interest. The largest cross-membership pattern, in terms of absolute numbers, can be examined in somewhat further detail. The overlapping membership described here is between APS and AAPT, OSA, AVS, and AAS. More than three-quarters of these multiple society members identify themselves as physicists, ranging from 75 and 76% of the APS-AVS, and APS-AAS members to 82% of the APS-OSA and 96% of the APS-AAPT members. If one compares these patterns to Fig. 25, it becomes apparent that these individuals are somewhat more likely to be physicists than all APS members, and considerably more likely to be so than the usual AAPT, OSA, AVS, or AAS members.

Differences in employer type of multiple members also exist, except in the case of the AAS-APS cross in which the employment is very similar to that noted for all AAS members. Within the other three major multiple membership groups, individuals employed in universities and colleges and to some extent FFR&DC's are overrepresented in the multiple membership group

[1]See technical notes, Appendix E, for further detail.

TABLE 6. Society cross membership, 1981.[a]

	APS %	AAPT %	OSA %	ASA %	AVS %	AAS %	AAPM %	ACA %	SoR %
APS	**80**[b]	30	19	6	19	17	14	13	13
AAPT	9	**66**	5	3	2	5	4	2	1
OSA	5	4	**75**	2	4	5	1	1	1
ASA	1	1	1	**91**	—	—	1	—	1
AVS	3	1	2	—	**78**	—	—	1	—
AAS	2	2	2	—	—	**77**	—	—	—
AAPM	1	1	—	—	—	—	**82**	—	—
ACA	1	—	—	—	—	—	—	**85**	—
SoR	—[c]	—	—	—	—	—	—	—	**86**
Total Membership	**27736**	**8437**	**7196**	**4774**	**3917**	**3465**	**1807**	**1421**	**1033**

[a] Data are based on all members current in 1981 and residing in the U.S. or Canada.
[b] Diagonal percentages (in bold) represent single society membership.
[c] Dashes represent less than 1% of the society's membership. Each column will not sum to 100% because 2% of all members belong to three or more societies and so are counted more than once.

while individuals employed in industry, and, for AAPT, junior colleges and secondary schools, are underrepresented. In respect to these groups, then, it is the university physicist who is most likely to hold joint society membership with APS. Where applicable in the individual society profiles, note will be made of general differences between single and multiple society members.

In addition to their common interest, however, each of the nine member societies has its own special concerns and characteristics. Each society is unique. Figure 25, on professional self-identification, and Fig. 26, on type of employer illustrate the rich diversity which can be found among society members. Some societies, such as AAPM, AAPT, APS, and AAS primarily consist of academically employed physicists and astronomers, although even here, there is variation. AAPM has the highest proportion among the societies, of members employed in nonprofit and other types of employment, primarily hospitals. AAPT is virtually the only society which has a significant representation of high school and junior college teachers. AAS, next to

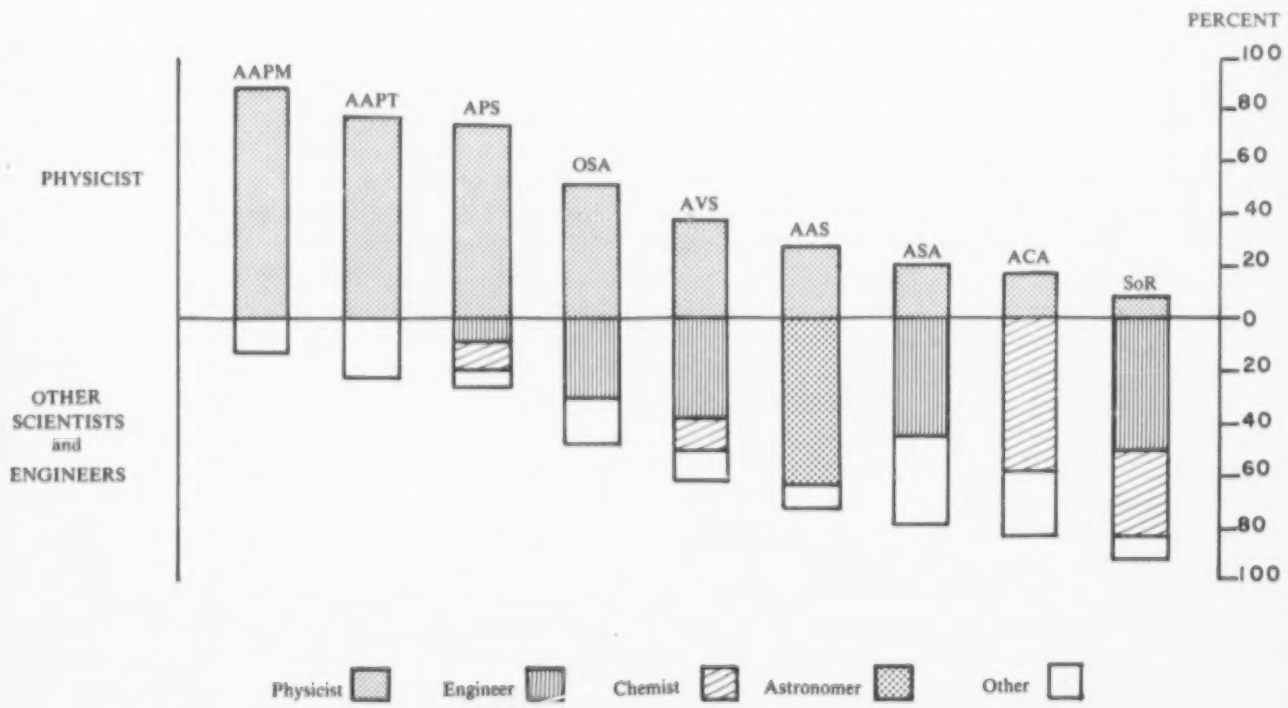


FIG. 25. Professional self-identification for each society, 1981.

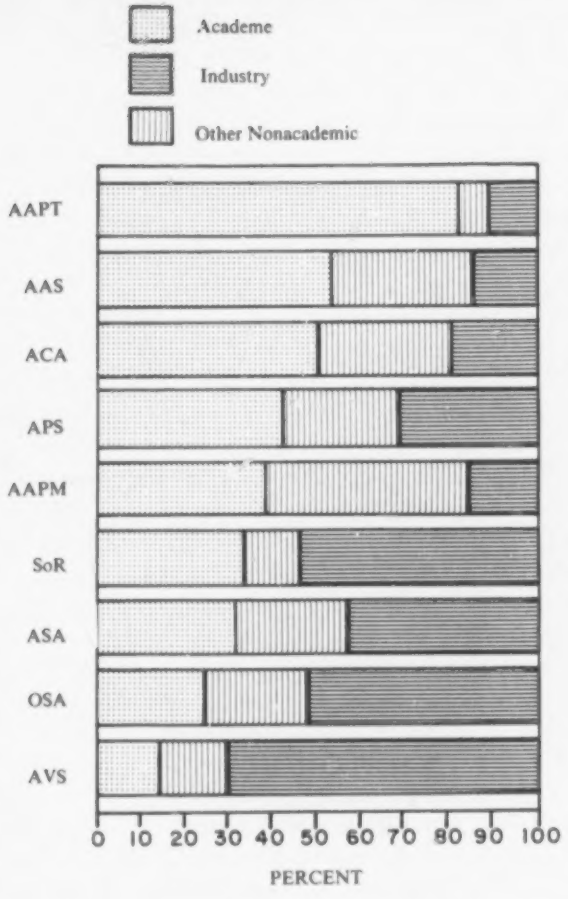


FIG. 26. Broad employer types for each society, 1981.

AAPT, the most academically involved of the societies, is the only society where astronomers and physicists intermingle extensively. APS, the largest of the member societies, has a diverse, but heavily research-oriented membership.

On the other hand, members of AVS, SoR OSA, and AAS are predominantly employed by industry, and have a relatively high proportion of engineers among their members. ACA, as can be noted, has its own structure, a relatively high proportion of academically employed chemists.

Such comparative data only begins to provide a picture of the variations existent among society members. The following profiles will highlight the major demographic and employment-related characteristics of each of the nine societies. Members who are interested in further detail on their own societies, or other societies which they may be considering joining, are encouraged to write us directly. The general type of data available for each society can be determined by examining the questionnaire instruments and subfield list presented in Appendix F.

Society Membership Profiles

American Association of Physicists in Medicine (AAPM)

AAPM members, the youngest among all of the societies, are basically working in Medical Physics, although most of them were originally trained in other areas. They have a strong academic base, some with joint appointments at university-affiliated hospitals; outside academe, hospitals, nonprofit research centers and private group practices predominante. Wherever they are employed, AAPM members are heavily involved in applied research, and such other work activities as radiology, dosimetry, and varied aspects of patient care. Those individuals who are members of AAPM only, are rather more likely than those holding multiple society membership to be involved in radiology, dosimetry, and related activities at hospitals and other nonprofit centers. AAPM continues to grow, although perhaps not quite as rapidly as in the past few years. The composition of their new members is very similar to that of the overall membership.

American Association of Physics Teachers (AAPT)

AAPT has the heaviest academic concentration among the nine member societies. Members are teaching in universities, four and two year colleges and secondary schools. AAPT is the only society to have a substantial representation of the last two groups, many of whom identify themselves as educators rather than physicists. While Ph. D.'s predominate among the membership, a full third of the members hold masters and a small proportion, mainly Secondary School teachers, are bachelors degree holders. Individuals for whom AAPT is their only society affiliation, and new members, giving AAPT as their initial society during 1979–80, are considerably more likely to be Secondary School teachers, and less likely to be university employed than other AAPT members. Part of this reflects AAPT's continuing efforts to attract Secondary School teachers whose concerns have frequently been overlooked by other scientific societies.

American Astronomical Society (AAS)

AAS is one of the three societies with a very high Ph. D. base, 85%. The members, who are some of the youngest among the societies, primarily identify themselves as astronomers and secondarily as physicists. The predominance of astronomers is even greater among those for whom AAS is their only society affiliation and among those new members who joined AAS as their initial society during 1979 and 1980. While the majority of AAS members is academically employed, a substantial number are also employed in government,

FFR&DS's and even industry. Except in industry, basic research predominates, coupled with teaching in the universities, applied research in the FFR&DC's and administration in government. The major subfield involvements of AAS members are astronomy and astrophysics, with over 1/3 of the members working in each of these two areas.

American Crystallographic Association (ACA)

ACA members, like the previously described AAS members, have a very high Ph. D. base, 85%. A relatively high proportion of them, 10%, are women. As Fig. 25 illustrates, the majority of ACA members considers themselves chemists. While most are directly involved in basic and applied chemical research, a substantial number of others are working in materials, biological and earth and environmental sciences. Physicsts are also represented, particulary among those ACA members who belong to more than one AIP member society. While they have a strong academic base, many members can also be found working in industry and government. ACA has not had a high input of new members recently; however, the new members who have joined have backgrounds quite similar to other ACA members.

American Physical Society (APS)

APS, the largest of all of the nine AIP member societies, also has a very high Ph. D. base, 83%. While universities remain the primary single employer type, nonacademic employment now predominates among APS members: 30% in industry, 13% in FFR&DC's, and 12% in government. In every employment area APS members basically consider themselves physicists, although there is a substantial representation of engineers among those employed in industry. As expected, basic research and teaching are the major activities of university employed members, while basic and applied research are predominant among those employed by government, federal labs. and nonprofit centers. For industrially employed APS members, work activities are more broadly distributed; while applied research predominates, development, design and engineering are also central. New APS members, although of course younger than other APS members, have basicaly the same characteristics as continuing members. New members do have a slightly higher proportion of individuals working in Chemical Physics than continuing members.

Acoustical Society of America (ASA)

ASA members, who predominantly identify themselves as engineers and secondarily as physicists, have a wide distribution among employer types. While industrial employment predominates, university and government employments are also important. ASA members employed in universities and government are primarily Ph. D.'s. A greater mesh of degree levels, Ph. D.'s, masters, and bachelors, are found among ASA members employed by industry. In addition to Physicist and Engineer, a large number of ASA members indicate an "other" scientific identification, primarily psychologist and audiologist. Along with Acoustics, the other major subfields for ASA members are Electrical and Electronic Engineering, Mechanical Engineering and Psychology, although individuals are distributed through a broad variety of other Physics fields. Individuals for whom ASA is their only society affiliation and new members, joining ASA as their initial society during 1979–80, are somewhat more likely to be engineers and related scientists than other ASA members. ASA also has a relatively high, 10%, proportion of women among its membership.

American Vacuum Society (AVS)

AVS, one of the fastest growing of the AIP member societies, has a heavy industrial base. Reflecting that base is the wide mixture of degree levels among the members. While nearly one-half of the members are Ph. D.'s. almost one-quarter are masters and one-quarter bachelors degree holders. A small percentage also hold other degrees. While AVS members predominantly consider themselves engineers, and secondarily, physicists and chemists, two-thirds of the small group of academically employed AVS members professionlly identify themselves as physicists. The major fields and subfields in which AVS members are working are Solid State Physics, Chemistry, Materials Science and Electrical, Electronic and Mechanical Engineering. Individuals for whom AVS is their only society affiliation and new members, joining AVS as their initial society during 1979 and 1980, were somewhat more likely than other members to consider themselves engineers. During 1981, AVS had the highest percentage of new members among the nine societies.

Optical Society of America (OSA)

In 1981, OSA, the third largest AIP member society, had a relatively high input of new members. There is considerable diversity among the OSA membership, which includes a good number of Ph. D.'s, masters and bachelors degree holders. OSA members are heavily represented in industry, universities and government, with a minor representation in FFR&DC's. Two-thirds of those working in government and FFR&DC's identify themselves as physicists as do over half of those employed in universities. Engineers have a strong secondary involvement in each of these areas. In indus-

try, on the other hand, physicists and engineers are equally involved. In addition to Optics, OSA members work in a broad variety of areas, the major ones being Solid State Physics, Atomic and Molecular Physics, Electrical and Electronic Engineering and Chemical Physics. Individuals for whom OSA is their only society affiliation, and new members, joining OSA as their initial society during 1979 and 1980 are, in contrast to other OSA members, more likely to be engineers and related scientists than physicists.

The Society of Rheology (SoR)

While SoR is the smallest of the AIP member societies, its growth in recent years has been quite rapid. In 1981 it had, after AVS, the highest percentage of new members. SoR members, mainly Ph. D.'s, are most frequently employed in industry as engineers and chemists with an additional mixture of physicsts. In the universities, where about one-third of SoR members are employed Ph. D.'s, engineers predominate. In addition to Rheology, the major subfields of work for SoR members are Chemical Engineering, Chemistry, High Polymer Physics and Mechanical Engineering. While some of the new SoR members are advanced graduate students, other are predominantly industrial engineers.

APPENDIX A. Dropping of Society Membership

During 1979 and 1980, slightly over ten percent of the original 1979 sample dropped society membership. From a small sample the absolute numbers thus produced are, of course, too small to warrant extensive discussion. As we follow up individuals from the expanded 1981 sample over the years, including those who drop society membership, a fuller analysis should be possible. However, some picture of the characteristics of individuals who dropped society membership can be gleaned from the 101 individuals who responded to the 1981 survey.

They were slightly younger than individuals who continued society membership, although not as young as the total current membership which included individuals who joined during 1979 and 1980. As Table A–1 indicates, individuals dropping society membership were less likely than society members to be physicists or astronomers and more likely to identify themselves as related scientists. They were also somewhat less likely than current members to have earned their Ph. D.'s. Among the Ph. D.'s who did leave a society, nearly half dropped membership within ten years after receiving their degrees. The next two tables also indicate that dropped members had somewhat different employment characteristics. They were less likely, than society members, to be employed in colleges and universities and more likely to be involved in design/engineering, administration and other technical activities.

In some respects (youth, level of degree, and professional self-identification), individuals dropping society membership are rather similar to new society members. Whether this means that dropped members are disproportionately drawn from those recently joining the societies will be examined further in future reports.

Perhaps the most striking characteristic of individuals dropping society membership is their tendency to also be making employer-related changes. In contrast to current society members, they were twice as likely to have changed employers and subfields of work, three times as likely to have changed professional self-identification, and somewhat more likely to have changed primary work activity. This is based on the small group of dropped society members who responded to our questionnaire. It is likely that changes among other dropped members, many of whom had moved and were not locatable, were even greater.

TABLE A–1. Current and dropped members, professional self-identification, 1981.

	Dropped Members %	Current Members %
Physicist/Astronomer	55	62
Engineer	15	16
Other Scientist	21	18
Other	9	4
Total Number Known	**101**	**6167**

TABLE A–2. Current and dropped society members, level of highest degree, 1981.

	Dropped Members %	Current Members %
Ph. D.	60	70
Masters	27	20
Bachelors[a]	13	10
Total Number Known	**101**	**6172**

[a] Includes those with technical degrees.

TABLE A–3. Current and dropped society members, type of employer, 1981.

	Dropped Members %	Current Members %
Industry/Self-Employed	36	32
University and College	28	39
Other Nonacademic	25	23
Junior College/Secondary School	11	6
Total Number Known	**93**	**5703**

TABLE A–4. Current and dropped society members, primary work activity, 1981.

	Dropped Members %	Current Members %
Teaching/Basic Research	33	48
Applied Research/Development	26	29
Design/Engineering	11	7
Administration & Other	30	16
Total Number Known	**93**	**5663**

TABLE A–5. Selected employment-related changes for dropped members, 1979–81.

	Dropped Members Reporting Change %	Members Reporting Change %
Employer	33	17
Primary Work Subfield	22	12
Primary Work Activity	21	14
Professional Self-Identification[a]	13	4

[a] Professional self-identification is based on all 1981 dropped members respondents. The remaining three types of change were based on those who were full-time or part-time employed in 1981.

APPENDIX B. Geographic Regions

NEW ENGLAND
- Connecticut
- Maine
- Massachusetts
- New Hampshire
- Rhode Island
- Vermont

MIDDLE ATLANTIC
- New Jersey
- New York
- Pennsylvania

SOUTH ATLANTIC
- Delaware
- District of Columbia
- Florida
- Georgia
- Maryland
- North Carolina
- South Carolina
- Virginia
- West Virginia
- Puerto Rico

EAST NORTH CENTRAL
- Illinois
- Indiana
- Michigan
- Ohio
- Wisconsin

EAST SOUTH CENTRAL
- Alabama
- Kentucky
- Mississippi
- Tennessee

WEST NORTH CENTRAL
- Iowa
- Kansas
- Minnesota
- Missouri
- Nebraska
- North Dakota
- South Dakota

WEST SOUTH CENTRAL
- Arkansas
- Louisiana
- Oklahoma
- Texas

MOUNTAIN
- Arizona
- Colorado
- Idaho
- Montana
- Nevada
- New Mexico
- Utah
- Wyoming

PACIFIC
- Alaska
- California
- Hawaii
- Oregon
- Washington

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Society Membership Detail

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TABLE C–1. Professional self-identification, 1981.

	%
Physicist	58
Engineer	16
Chemist	10
Astronomer	4
Other Scientist	8
Other	4
Total Number Known	**6167**
No Response	24

TABLE C–2. Regional distribution of society members in the U.S. 1981 and total U.S. population.[a]

Region	Society Members %	U.S. Population %
New England	11	5
Middle Atlantic	20	16
South Atlantic	15	18
East North Central	13	18
East South Central	3	6
West North Central	4	8
West South Central	5	10
Mountain	8	5
Pacific	21	14
Total Number Known	**51051**[b]	**230 Million**

[a] Based on 1980 census records.
[b] Based on all society members current as of 12/31/81.

TABLE C–3. Age profile of society members, 1981.

Year of Birth	%
1950 +	15
1945–1949	16
1940–1944	17
1935–1939	15
1930–1934	11
1925–1929	9
1920–1924	8
1915–1919	4
Before 1915	5
Total Number Known	**5738**
No Response	453

TABLE C–4. Level of highest degree by years since highest degree, 1981.

Year of Highest Degree	Level of Highest Degree Ph.D. %	Masters[a] %	Bachelors[a] %
Before 1950	5	8	22
1950–1959	17	18	28
1960–1969	34	34	21
1970 +	44	40	29
Total Number Known	**3969**	**871**	**400**
No Response	48	12	4

[a] Advanced graduate students are not included in this table.

TABLE C–5. Race and minority status by citizenship, 1981.

Race and Minority Status	Citizenship U.S. N.	Non-U.S. N.	Total	%
White	5007	410	5417	91.1
Oriental and Other Asian	223	176	399	6.7
Black, American Indian, and Hispanic	75	5	80	1.3
Other	40	11	51	0.9
Total Number Known	**5345**	**602**	**5947**	
No Response	81	13	94	

TABLE C–6. Employment status, 1981.

	%
Employed Full-Time	89
Employed Part-Time	4
Not Employed, Not Seeking[a]	6
Not Employed, Seeking Employment	1
Total Number Known	**6139**
No Response	52

[a] Includes retired.

TAPLE C–7. Type of employer, 1981.

	%
ACADEMIC	**45**
University	35
College	4
Junior College	2
Secondary School	4
NONACADEMIC	**55**
Industry/Self-Employed	31
Government	11
FFR&DC	9
Nonprofit	3
Other	1
Total Number Known Employed	**5703**
No Response	14

TABLE C–8. Principal work activity, 1981.

	%
Teaching	23
Basic Research	25
Applied Research	21
Development	8
Design/Engineering	7
Administration	11
Other	5
Total Number Known	**5663**
No Response	54

TABLE C–9. Principal work activity by level of highest degree, 1981.

	Ph.D. %	Masters[a] %	Bachelors[a] %
Teaching	24	30	11
Basic Research	29	5	5
Applied Research	22	16	17
Development	6	13	18
Design/Engineering	4	14	24
Administration	12	13	16
Other	3	9	9
Total Number Known	**3979**	**879**	**401**
No Response	38	5	3

[a] Advanced graduate students are not included.

TABLE C–10. Type of employer by highest degree, 1981.

	Ph.D. %	Masters[a] %	Bachelors[a] %
ACADEMIC	**48**	**36**	**15**
University	42	8	4
College	5	3	—
Jr. College	1	8	2
Secondary School	—	17	9
NONACADEMIC	**52**	**64**	**85**
Industry/Self-Employed	26	42	62
Government	11	13	11
FFR&DC	11	3	6
Nonprofit	3	4	4
Other	1	2	2
Total Number Known	**4004**	**883**	**404**
No Response	13	1	0

[a] Advanced graduate students are not included.

TABLE C–11. Employer type by sex, 1981.

	Male %	Female %
ACADEMIC	**44**	**55**
University	35	39
Other Academic	9	16
NONACADEMIC	**56**	**45**
Industry and Self-Employed	32	22
Government	11	11
FFR&DC	9	7
Nonprofit and Other	4	5
Total Number Known	**5241**	**314**
No Response	17	1

TABLE C–12. Work activity by degree level for members employed in industry, 1981.

Work Activity	Ph.D. %	Masters %	Bachelors %
Basic Research	12	2	3
Applied Research	42	24	15
Development	17	23	22
Design/Engineering	10	27	31
Administration	16	18	19
Other	3	6	10
Total Number Known	**992**	**341**	**215**

TABLE C–13. Type of employer by cohort year of Ph.D.,[a] 1981.

	1979–1981 %	1976–1978 %	1973–1975 %	1970–1972 %	1967–1969 %	1964–1966 %	1961–1963 %	Before 1961 %
ACADEMIC	**32**	**40**	**40**	**40**	**49**	**56**	**54**	**54**
University	25	32	31	31	41	52	48	50
Other Academic	7	8	9	9	8	4	6	4
NONACADEMIC	**68**	**60**	**60**	**60**	**51**	**44**	**46**	**46**
Industry[b]	45	36	35	28	23	20	24	21
Other Nonacademic	23	24	25	32	28	24	22	25
Total Number Known	**243**	**359**	**427**	**543**	**511**	**431**	**303**	**967**
No Response	2	—	1	—	—	—	—	3

[a] Includes postdocs.
[b] Includes self-employed.

TABLE C–14. Type of employer by professional self-identification, 1981.

Employer Type	Physicists %	Astronomers %	Engineers %	Chemists %	Computer Scientists %	Other Scientists %	Other %	Total %
ACADEMIC	**48**	**62**	**23**	**50**	**15**	**57**	**58**	**45**
University	37	56	21	44	12	50	16	35
Other Academic	11	6	2	6	3	7	42	10
NONACADEMIC	**52**	**38**	**77**	**50**	**85**	**43**	**42**	**55**
Industry/Self-Employed	25	9	60	28	70	20	27	31
Government	12	12	9	9	6	14	6	11
FFR&DC	11	12	5	10	5	4	2	9
Nonprofit	3	4	2	3	4	4	2	3
Other	1	1	1	—	—	1	5	1
Total Number Known	**3271**	**261**	**922**	**540**	**79**	**363**	**244**	**5680**
No Response	7	1	4	4	—	3	—	19

TABLE C–15. Principal work activity by type of employer, 1981.

	University %	Other Academic %	Industry/ Self-Employed %	Government %	FFR&DC %	Other %
Teaching	38	91	—	—	—	4
Basic Research	44	2	8	28	38	19
Applied Research	9	1	32	28	36	23
Development	1	—	19	8	6	6
Design/Engineering	1	—	18	4	6	8
Administration	6	6	16	23	12	11
Other	1	—	7	9	2	29
Total Number Known	**2000**	**552**	**1746**	**625**	**508**	**217**
No Response	24	5	13	2	5	3

TABLE C–16. Age profile by academic rank,[a] 1981.

Birth Year Cohort	Prof. %	Assoc. Prof. %	Asst. Prof. %	Res. Assoc. %	Other[b] %
1950 +	—	1	18	32	22
1945–1949	1	16	42	35	23
1940–1944	13	35	23	17	16
1935–1939	24	23	10	8	12
1930–1934	21	11	3	5	6
1925–1929	18	7	2	1	10
1920–1924	14	3	1	1	9
1915–1919	7	3	1	—	1
Before 1915	2	1	—	1	1
Total Number Known	**839**	**359**	**245**	**182**	**139**
No Response	95	35	21	6	8

[a] Includes university and college full-time only. Graduate students are not included.
[b] Includes administrators, lecturers, instructors, and others.

TABLE C–17. Age profile by tenure status,[a] 1981.

Birth Year Cohort	Tenured %	Tenure-line %	Other %
1950 +	—	16	25
1945–1949	5	40	32
1940–1944	19	27	18
1935–1939	23	11	12
1930–1934	19	2	5
1925–1929	15	2	3
1920–1924	11	1	3
1915–1919	6	—	1
Before 1915	2	1	1
Total Number Known	**1157**	**224**	**345**
No Response	120	14	25

[a] Includes university and college full-time employed only. Graduate students are not included.

TABLE C–18. Predominant fields and subfields of work by highest degree, 1981.[a]

	Ph.D. %		Masters %		Bachelors %	
PHYSICS AND ASTRONOMY	67		60		53	
Predominant Physics Subfields of Work		Solid State Physics Astronomy/Astrophysics Physics Ed. (Coll)[b] Nuclear Physics Plasma Physics Elementary Particles		Physics, Ed. (SS)[b] Optics Physics, Ed. (Coll)[b] Medical Physics Acoustics		Optics Acoustics Vacuum Science Physics, Ed. (SS)[b]
ENGINEERING	11		18		29	
Predominant Subfields of Work		Electronic Electrical Systems		Electronic General Systems		General Electronic Mechanical
OTHER SCIENCE	17		15		13	
Predominant Fields of Work		Chemistry Materials Science Computer Science		Computer Science Chemistry Materials Science		Computer Science Chemistry Materials Science
OTHER AREAS	5		7		5	
Total Number Known	**3780**		**796**		**346**	
No Response	238		88		58	

[a] Does not include graduate students.
[b] SS–Secondary Schools, Coll–College.

TABLE C–19. Detailed fields and subfields of work, 1981.

	N.	%
Physics and Astronomy Subfield	**3434**	**65**
Solid State Physics	385	
Physics Education, College	324	
Optics	296	
Plasma Physics	202	
Nuclear Physics	201	
Elementary Particles and Fields	187	
Chemical Physics	175	
Acoustics	169	
Medical Physics	166	
Atomic and Molecular Physics	164	
Astrophysics	156	
Astronomy	150	
General Physics	126	
Physics Education, Pre-College	122	
Biophysics	62	
Geophysics	56	
Electronics	54	
Mathematical Physics	53	
Fluid Dynamics	51	
Low Temperature Physics	48	
Crystallography	46	
High Polymer Physics	41	
Vacuum Science	39	
Electromagnetism	34	
Thermal Physics	24	
Mechanics	17	
Rheology	15	
Physics, Other	71	
Engineering Subfields	**706**	**13**
Electronic	162	
Electrical	90	
Systems	81	
Mechanical	74	
General Engineering	63	
Nuclear	53	
Aeronautical and Astronomical	48	
Chemical	38	
Environmental	17	
Engineering, Other	80	
Other Science Fields	**875**	**17**
Chemistry	218	
Materials Science	147	
Computer Science	118	
Science Administration	80	
Biological Science	58	
Psychology	55	
Earth and Environmental Science	49	
Math and Statistics	45	
General Science Education	18	
Other Science	87	
Other Areas	**283**	**5**
Educational Administration	78	
Other Administration	119	
Nonscience, Other	86	
Total Number Known	**5298**	
No Response	419	

TABLE C–20. Professional self-identification of society members by fields and subfields of current work, 1981.

Field and Subfield of Work[a]	Professional Self-Identification		
	% Physicist	% Engineer	% Other[b]
Elementary Particles	98	1	1
Nuclear Physics	97	1	2
Low Temperature Physics	96	2	2
Plasma Physics	95	3	2
Solid State Physics	95	3	2
Physics Education, College	94	1	5 (Ch)
Thermal Physics	94	—	6
Medical Physics	92	2	6
Mathematical Physics	92	—	8 (M)
General Physics	92	2	6
Physics, Other	89	4	7
Atomic & Molecular Physics	87	1	12 (Ch)
Electromagnetism	82	12	6
Geophysics	76	4	20
Biophysics	73	2	25 (B,Ch)
Electronics	72	18	10
Optics	66	29	5
Science Administration	59	9	32
Educational Administration	56	9	35
Fluid Dynamics	55	39	6
Physics Education—Pre-College	53	3	44
Earth & Environmental Science	52	6	42
Astrophysics	49	—	51 (A)
Systems Engineering	45	45	10
Acoustics	41	43	16
High Polymer Physics	40	6	54 (Ch)
Nuclear Engineering	38	58	4
General Engineering	36	60	4
Materials Science	33	22	45
Vacuum Science	31	49	20
Chemical Physics	31	1	68 (Ch)
Aero & Astro Engineering	31	63	6
Computer Science	31	11	58 (CS)
Math & Statistics	25	9	66 (M)
Crystallography	23	2	75 (Ch)
Electronic Engineering	23	75	2
Electrical Engineering	23	74	3
Astronomy	12	1	87 (A)
Mechanical Engineering	10	85	5
Biology	5	4	91 (B)
Psychlogy	4	—	96 (P)
Chemical Engineering	3	82	15 (Ch)
Chemistry	3	1	96 (Ch)

[a] Only subfields with 30 or more respondents working in them are listed. They are ordered by % Physicist.

[b] If a specific "other scientist" identification predominates, it is notated as follows: A—Astronomer, B—Biologist, Ch—Chemist, CS—Computer Scientist, M—Mathematician, P—Psychologist.

TABLE C–21. Selected primary and secondary employment subfields, 1981.

Primary Subfield[a]	Citing Primary Subfield Only %	Major Secondary Subfields Cited
Elementary Particles	57	Physics Ed., Nuclear Physics, Math
Medical Physics	52	Admin., Physics Ed., Computer Science
Psychology	37	Acoustics, Biology, Computer Science
Plasmas	33	Atomic and Molecular Physics
Physics Education	33	----------
Astronomy	32	Astrophysics
Astrophysics	32	Astronomy
Chemical Engineering	32	Rheology, Chemistry, Material Science
Nuclear Physics	32	Physics Education
Computer Science	30	Systems Engineering
General Engineering	28	Electronic and Systems Engineering
Educational Administration	26	Physics Education
Electronics Engineering	23	Solid State, Acoustics, Optics
Mechanical Engineering	22	General Engineering, Acoustics, Mechanics
Geophysics	22	----------
Math and Statistics	21	Computer Science
Science Administration	21	General Physics, General Administration
General Administration	21	----------
High Polymer Physics	20	Material Science, Rheology, Chemistry
General Physics	20	General Engineering
Biological Science	20	Biophysics, Psychology
Chemistry	20	Chemical Physics, Crystallography, Material Science
Optics	19	General Engineering
Solid State	19	Material Science, Optics, Low Temp. Physics
Atomic and Molecular Physics	18	Chemical Physics, Optics
Chemical Physics	18	Chemistry, Atomic & Molecular Physics, Solid State Physics
Nuclear Engineering	18	Nuclear Physics, Plasmas, Systems Engineering
Acoustics	16	Mechanical Engineering
Low Temperature Physics	15	Solid State Physics
Biophysics	14	Biology, Physics Ed., Chemical Physics
Vacuum Science	14	Material Science, General Administration
Material Science	14	Solid State, Vacuum Science
Crystallography	14	Chemistry, Material Science, Solid State Physics
Mathematical Physics	12	Computer Science, Atomic & Molecular Physics
Electrical Engineering	12	Solid State, Optics
Earth & Environmental Science	12	Optics, Science Administration
Aeronautical and Astronautical Eng.	8	Systems Engineering
Systems Engineering	6	Optics, Electronics Engineering
Electronics	6	Optics, Solid State, Electronics Engineering
Electromagnetism	—	Electronics, Optics
Fluid Dynamics	—	Mechanical Engineering, Geophysics

[a] Subfields are ordered by % citing a primary subfield only. Students are excluded from this table, as are any subfields with 30 or fewer members represented.

TABLE C–22. Selected subfields of work by median age and highest degree, 1981.

	Ph. D. Median Age	Masters[a]	Bachelors[a]
Plasmas	38.5	—	—
Astrophysics	39.3	—	—
Medical Physics	40.0	37.1	—
Optics	40.8	42.6	46.5
Acoustics	40.8	46.5	49.5
Atomic & Molecular Physics	41.0	—	—
Chemical Physics	41.0	—	—
Elementary Particles	41.3	—	—
Solid State Physics	42.9	—	—
Nuclear Physics	43.9	—	—

[a] Median ages have not been calculated for many of the subfields here, because of the very small nonstudent cell size.

TABLE C–23. Type of postdoctoral employer, 1981.

	%
University and Colleges	71
FFR&DC's	11
Industry	10
Government	6
Nonprofit and Other	2
Total Number Known	**232**

TABLE C–24. Fields and subfields of current postdoctoral research, 1981.

Field and Subfield	N.	%
Physics and Astronomy	**186**	**82**
Elementary Particles	28	
Astrophysics	22	
Astronomy	21	
Solid State Physics	17	
Nuclear Physics	16	
Plasma Physics	15	
Chemical Physics	15	
Biophysics	10	
Atomic & Molecular Physics	9	
Other Physics	33	
Engineering	**6**	**3**
Other Science	**35**	**15**
Biology	11	
Chemistry	9	
Total Number Known	**228**	
No Response	3	

TABLE C–25. Self-employed society members, primary work activity, 1981.

Primary Work Activity	%
Development, Design and Engineering	32
Applied Research	20
Administration	12
Basic Research and Teaching	6
Other[a]	30
Total Number Known	**120**

[a] Many individuals in this category noted they were consultants. In the 1982 survey, consulting was added as an additional work activity.

TABLE C–26. Self-employed society members, fields and subfields of work, 1981.

Field and Subfield	N.	%
Physics	**56**	**54**
Acoustics	12	
Optics	11	
Medical Physics	9	
Other Physics	24	
Engineering	**18**	**18**
Other Science	**10**	**10**
Nonscience	**19**	**18**
Total Number Known	**103**	**100**

TABLE C–27. Self-employed society members by employment status and birth year, 1981.

Birth Year	Full-Time Employed N.	Part-Time Employed N.
1950 +	6	—
1945–1949	9	1
1940–1944	14	3
1935–1939	13	—
1930–1934	12	1
1925–1929	13	2
1920–1924	12	5
1915–1919	5	4
Before 1915	5	7
Total Number Known	**88**	**23**

TABLE C–28. Professional self-identification for Canadians, 1981.

	%
Physicist	64
Astronomer	10
Engineer	8
Chemist	8
Other Scientist	6
Other	5
Total Number Known	**200**
No Response	1

TABLE C–29. Type of employer for Canadians, 1981.

	%
ACADEMIC	**64**
University	54
College	5
Other Academic	5
NONACADEMIC	**36**
Industry/Self-Employed	18
Government	16
Other	2
Total Number Known	**183**
No Response	1

TABLE C–30. Detailed fields and subfields of work for Canadians, 1981.

	N.	%
Physics and Astronomy	**134**	**77**
Solid State Physics	16	
Physics Education, College	16	
Nuclear Physics	13	
Astronomy	12	
Optics	10	
Atomic and Molecular Physics	8	
Chemical Physics	8	
Elementary Particles	7	
Astrophysics	6	
Acoustics	6	
Medical Physics	6	
Plasma Physics	6	
Physics, Other	20	
Engineering	**11**	**6**
Other Science	**19**	**11**
Other Areas	**11**	**6**
Total Number Known	**175**	
No Response	9	

TABLE C–33. New and continuing society members, professional self-identification, 1981.

Professional Self-Identification	New Members 1979–1980 %	Continuing Members[a] Pre-1979 %
Physicist	47	59
Engineer	20	16
Chemist	13	9
Astronomer	4	4
Biologist	2	1
Mathematician	1	1
Computer Scientist[b]	1	1
Other Scientist	5	5
Other	7	4
Total Number Known	**667**	**5500**
No Response	4	20

[a] This includes individuals who become society members prior to 1979 and have not dropped membership prior to the 1981 survey.
[b] This is a low estimate since computer scientist as a professional self-identification category was first introduced in 1981.

TABLE C–31. Academic rank by sex and birth year, 1981.[a]

Cohort Year of Birth	Full and Assoc. Professor		Ass't. Professor		Other Acad. Ranks		Total	
	Male %	Female %	Male %	Female %	Male %	Female %	Male N.	Female N.
1934 & Earlier	93	70	2	15	5	15	643	20
1935–1944	78	41	11	32	11	27	636	41
1945 +	17	11	38	40	45	49	359	35
Percent Female	3%		12%		10%		6%	

[a] University and college full-time employed only. Excludes graduate students and administrators. NONE OF THE WOMEN IN OUR RESPONDENT GROUP HELD AMINISTRATIVE POSITIONS.

TABLE C–32. Year of birth distributions for employed new and continuing society members, 1981.[a]

	New Members 1979–1980 %	Continuing Members Pre-1979 %
1955 +	8	—
1950–1954	31	7
1945–1949	27	16
1940–1944	15	20
1935–1939	10	18
1930–1934	4	13
1925–1929	4	11
1920–1924	2	9
1915–1919	—	4
Before 1915	—	2
Total Number Known	**395**	**4505**

[a] Students are excluded.

TABLE C–34. New and continuing society members, type of employer, 1981.[a]

	New Members 1979–1980 %	Continuing Members Pre-1979 %
ACADEMIC	44	43
University	31	33
College	5	7
Secondary Schools	8	3
NONACADEMIC	56	57
Industry/Self-Employed	40	31
Government	6	12
FFR&DC	6	10
Nonprofit and Other	4	4
Total Number Known	**433**	**4921**
No Response	—	12

[a] Students are excluded from this table. They are primarily teaching and research assistants at universities; they represent over one-quarter of the employed new members in contrast to less than one-fifteenth of the continuing members.

TABLE C–35. New and continuing society members, degree distribution, 1981.[a]

	New Members 1979–1980 %	Continuing Members Pre-1979 %
Ph.D.'s	59	76
Masters	21	16
Bachelors	16	7
Other	3	1
Total Number Known	**431**	**4925**
No Response	2	9

[a] Students are not included in this table.

TABLE C–36. New and continuing society members, fields and subfields of work, 1981.

Field and Subfield of Work[a]	New 1979–1980 %	Total Number Known
Chemical Engineering	26.3	38
Vacuum Science	20.5	39
High Polymer Physics	17.1	41
Low Temp. Physics	16.7	48
Psychology	16.4	55
Physics Ed., Precollege	15.6	122
Chemical Physics	14.3	175
Optics	13.5	296
Chemistry	13.3	218
Biophysics	12.9	62
Materials Science	12.2	147
Biological Science	12.1	58
Fluid Dynamics	11.8	51
Electronic Engineering	11.1	162
Math and Statistics	11.1	45
Mechanical Engineering	10.8	74
Astronomy	10.7	150
Solid State Physics	10.4	385
Aero. & Astro. Engineering	10.4	8
Medical Physics	10.2	166
Electrical Engineering	10.0	90
Overall	10.0	5298
Atomic & Molecular Physics	9.8	164
Elementary Particles	9.6	187
Acoustics	9.5	169
Mathematical Physics	9.4	53
Electronics	9.3	54
Astrophysics	9.0	150
Geophysics	8.9	56
Systems Engineering	8.6	81
Plasma Physics	7.9	202
General Physics	7.9	126
General Engineering	7.9	63
Computer Science	6.8	118
Crystallography	6.5	46
Nuclear Physics	6.5	201
Earth & Environmental Sci.	6.1	49
Electromagnetism	5.9	34
Nonscience	5.8	86
Physics Education, College	5.6	324
Other Physics	5.6	71
Science Administration	5.0	80
Nonscience Administration	4.2	119
Nuclear Engineering	3.8	53
Educational Administration	2.6	78

[a] Only subfields with 30 or more respondents working in them are listed. They are ordered by proportion of new members, from highest to lowest.

TABLE C–37. Professional self-identification for students, 1981.

	%
Physicist	57
Astronomer	6
Engineer	13
Chemist	11
Other Scientist	10
Other	3
Total Number Known	**418**
No Response	2

TABLE C–38. Detailed fields and subfields for students, 1981.

Degree Field	N.	%
Physics and Astronomy	**286**	**74**
Solid State Physics	59	
General Physics	57	
Elementary Particles	27	
Chemical Physics	20	
Astrophysics	15	
Optics	14	
Astronomy	13	
Plasma Physics	12	
Low Temperature	10	
Physics, Other	59	
Engineering	**34**	**9**
Other Science	**61**	**16**
Chemistry	24	
Materials	8	
Psychology	8	
Science, Other	21	
Other Areas	**3**	**1**
Total Number Known	**384**	
No Response	36	

TABLE C–39. Mobility among selected employer types, 1979–1981.[a]

	Net Change %	In Mobility %	Out Mobility %	Total Number Known in 1979
Industry	+ 16	21	5	446
FFR&DC	+ 3	11	8	169
Government	—	8	8	198
University	− 7	5	12	675

[a] These data are based on those members responding to our survey in the two years specified.

TABLE C–40. Mobility among selected professional self-identifications, 1979–1981.

	Net Change %	In Mobility %	Out Mobility %	Total Number Known in 1979
Engineer	+ 4	8	4	280
Physicist	− 3	1	4	1130
Astronomer	− 4	—	4	84
Chemist	− 5	1	6	173

TABLE C–41. Mobility among primary work activities, 1979–1981.

	Net Change %	In Mobility %	Out Mobility %	Total Number Known in 1979
Development	+ 20	28	8	122
Administration	+ 15	30	15	163
Design/Engineering	+ 14	30	16	93
Applied Research	+ 6	19	13	327
Teaching	− 4	7	11	449
Basic Research	− 9	6	15	472

TABLE C–42. Net change in selected fields and subfields of work, 1979–1981.[a]

	Net Change 1979–1981 %	Total Number Known in 1979
Computer Science	+ 29	31
Electrical and Electronic Engineering	+ 24	58
Nonscience	+ 21	29
Optics	+ 11	84
General Physics	+ 11	37
Mechanical and Systems Engineering	+ 8	52
Solid State Physics	− 4	132
Physics Education, College	− 7	106
Chemical Physics	− 7	60
Astrophysics	− 9	55
Nuclear Physics	− 10	71

[a] The percent net change is cumulative over the 2 years.

TABLE C–43. 1981 salaries by type of employer.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
University	30.5	32.3	11.5	43	1546	104
College	24.0	24.8	6.9	43	203	14
Junior College	25.8	25.9	6.2	44	87	7
Secondary School	22.0	22.6	7.1	42	185	12
Industry/Self-Employed	40.0	42.7	16.3	41	1510	145
Government	40.0	39.7	8.8	43	551	25
FFR&DC	37.6	38.1	9.4	41	458	36
Nonprofit	36.0	37.9	12.8	40	146	5
Other	32.0	34.8	14.7	38	49	6

TABLE C–44. 1981 salaries by level of highest degree.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
Ph.D.	36.0	37.1	13.3	42	3574	256
Masters	31.0	33.4	13.2	43	778	57
Bachelors	35.0	36.3	18.2	45	344	36

TABLE C–45. 1981 industrial salaries by sex.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number	No Response
OVERALL						
Male	40.0	43.1	16.3	42	1425	132
Female	30.0	32.1	8.8	31	57	6
BIRTH YEAR						
1950 +						
Male	30.0	30.7	7.8	29	169	14
Female	27.5	28.0	5.5	29	28	2
1945–49						
Male	35.0	35.9	7.3	34	262	10
Female	29.0	30.4	5.4	34	15	1
Before 1945						
Male	44.7	46.8	16.1	47	925	94
Female	40.5	42.8	9.6	47	13	1

TABLE C–46. 1981 university and college salaries by sex.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number	No Response
FULL AND ASSOC. PROF. (9–10 Month Base)						
Male	30.0	31.8	8.3	47	758	35
Female	29.2	28.5	5.1	44	19	2
FULL AND ASSOC. PROF. (11–12 Month Base)						
Male	40.0	41.4	11.2	46	310	10
Female	35.3	40.7	12.4	45	11	1
OTHER RANKS[a] (9–10)						
Male	19.9	20.4	4.0	35	137	8
Female	19.0	20.1	2.9	37	16	3
OTHER RANKS[a] (11–12)						
Male	24.0	25.6	10.2	34	259	10
Female	20.5	21.1	6.5	36	37	—

[a] Excludes administrators.

TABLE C–47. 1981 industrial salaries by years from degree, Bachelors.

	Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number	No Response
Industry	0–4	24.5	25.0	7.0	26	25	0
	5–9	25.3	26.8	6.1	30	26	3
	10–14	35.0	35.5	9.3	36	23	3
	15–19	36.0	36.3	8.6	41	17	2
	20–24	40.0	42.4	17.0	48	41	2
	25 +	41.0	47.3	25.6	58	81	16

TABLE C–48. 1981 salaries by major employer type, Masters.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
Secondary School	23.0	23.1	5.7	43	139	7
Industry/Self-Employed	37.0	39.6	15.2	43	331	26
Government	35.6	36.8	8.3	42	108	7
Nonprofit	33.0	33.8	7.4	37	31	2

TABLE C–49. 1981 salaries by major employer type, Ph.D.'s.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
University						
9–10 Month Salary Base	30.0	31.2	8.8	45	787	37
11–12 Month Salary Base	33.0	34.1	13.6	40	594	22
Colleges						
9–10 Month Salary Base	23.0	24.4	6.3	42	142	8
Industry/Self-Employed	41.8	44.8	15.1	40	937	87
Government	40.0	40.5	8.7	43	396	16
FFR&DC	38.0	38.6	9.3	41	411	31
Nonprofit	38.0	39.9	14.2	41	101	3
Other	40.0	39.2	11.9	39	23	2

TABLE C–50. 1981 salaries by years from highest degree, Ph.D.'s.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
Years from Ph.D.						
0–4	27.5	26.8	8.6	32	568	28
5–9	32.0	32.5	9.1	36	727	46
10–14	36.0	36.8	11.9	40	774	54
15–19	40.0	40.1	11.3	45	562	57
20–24	43.0	43.8	13.4	51	339	20
25–29	44.7	46.1	14.8	56	315	19
30 +	48.0	47.9	16.3	60	233	29

TABLE C–51. 1981 salaries by geographic region[a], Ph.D.'s.

Geographic Region	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
New England	36.9	37.4	13.0	41	328	22
Middle Atlantic	37.8	39.1	15.1	42	676	67
South Atlantic	36.7	37.4	11.0	42	596	30
East North Central	34.0	35.2	12.8	44	482	39
East South Central	32.0	32.2	9.2	42	132	8
West North Central	31.0	31.6	11.3	41	149	17
West South Central	33.0	34.1	13.5	41	212	15
Mountain	35.0	35.8	11.7	41	320	22
Pacific	38.0	39.7	14.3	42	681	38

[a]See Appendix B for state composition of each region.

TABLE C–52. 1981 median salaries for selected subfields by type of employer, Ph. D.'s only, 1981.

	University 9 Mos.		University 10–11 Mos.		Industry		Other Nonacademic	
	Median Salary (in thousands)	Age (N.)	Median Salary	Age (N.)	Median Salary	Age (N.)	Median Salary	Age (N.)
Astrophysics	$29.5	41 (34)	$26.4	36 (42)	*	*	$35.3	40 (35)
Acoustics	28.0	43 (9)	38.0	42 (8)	40.0	38 (33)	39.6	41 (25)
Atomic & Molecular Physics	28.2	46 (41)	28.5	41 (26)	38.3	38 (14)	40.2	41 (40)
Chemical Physics	28.7	46 (40)	29.0	35 (24)	37.7	37 (32)	36.1	39 (33)
Elementary Particles	31.7	45 (48)	30.2	39 (54)	*	*	36.0	40 (37)
Medical Physics	*	*	35.0	39 (38)	37.0	40 (10)	39.4	41 (30)
Nuclear Physics	32.7	48 (50)	34.5	40 (39)	40.0	36 (17)	40.0	45 (50)
Optics	24.6	45 (13)	40.0	46 (13)	42.6	40 (74)	37.8	39 (35)
Plasmas	31.9	44 (17)	30.5	34 (32)	38.6	37 (32)	37.0	39 (75)
Solid State	29.7	44 (60)	34.8	43 (33)	43.0	39 (95)	40.0	43 (69)

*Number too small to calculate medians.

TABLE C-53. 1981 salaries for Ph.D.'s by type of employer and years from degree.[a]

Employer Type	Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
University							
	0–4	19.5	20.8	4.4	33	51	3
(9–10 Month	5–9	23.6	23.7	3.8	36	101	4
Salary Base)	10–14	26.0	27.1	5.1	40	152	9
	15–19	31.0	32.1	6.6	45	178	9
	20–24	35.0	35.8	7.1	50	114	7
	25 +	38.6	39.0	8.7	58	170	5
University							
	0–4[a]	23.4	23.8	6.1	32	47	2
(11–12 Month	5–9	30.0	30.9	9.0	35	103	5
Salary Base)	10–14	35.0	36.8	11.0	40	103	1
	15–19	38.5	39.4	8.9	45	99	8
	20–24	42.0	42.8	9.5	49	46	—
	25 +	48.8	49.5	11.6	57	84	3
Industry/Self-Employed							
	0–4	34.0	34.2	4.8	31	187	14
	5–9	37.7	38.8	7.8	36	220	21
	10–14	45.0	46.2	12.5	40	197	18
	15–19	50.0	51.7	12.4	45	115	17
	20–24	52.0	55.1	18.4	50	80	1
	25 +	51.0	55.6	21.4	58	130	16
Government							
	0–4	28.0	29.8	7.5	33	53	1
	5–9	34.9	35.0	5.6	37	81	3
	10–14	39.1	39.8	6.7	41	98	4
	15–19	45.4	44.8	5.1	45	64	4
	20–24	50.0	48.4	3.2	51	38	2
	25 +	50.0	49.1	5.0	58	60	2
FFR&DC							
	0–4	30.0	28.7	6.5	32	57	1
	5–9	33.0	33.1	5.3	35	90	3
	10–14	38.0	38.7	6.2	40	106	7
	15–19	41.7	42.4	5.8	45	66	6
	20–24	44.8	46.0	7.6	52	44	7
	25 +	45.7	48.8	10.6	58	45	7

[a] In addition, there are 84 postdocs with known salaries working in universities on an 11–12 month salary base. Their median salary is $16 5000.

TABLE C-54. 1981 salaries by selected academic ranks and tenure status.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	No Response
Professor, Tenured						
9–10 Month Salary Base[b]	33.1	34.5	8.1	49	559	21
11–12 Month Salary Base	42.4	44.3	11.1	49	219	10
Associate Professor, Tenured						
9–10 Month Salary Base	25.0	25.4	3.6	42	198	14
11–12 Month Salary Base	33.6	35.0	9.1	40	66	2
Assistant Professor, Tenure Line						
9–10 Month Salary Base	20.0	21.0	4.0	34	105	9
11–12 Month Salary Base	27.7	30.5	11.3	35	57	0
Research Associate						
11–12 Month Salary Base	21.0	22.9	7.7	34	148	5

[a] Includes university and college full-time employed only.

[b] A difference in median 9–10 month salaries between colleges and universities can be noted only at this professorial rank: $28 000 in colleges, $34 200 in univiersities.

TABLE C-55. 1979 and 1981 salaries for members continuing employment by selected employer type.[a]

	Salary Year	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
UNIVERSITY						
(9–10 month	1979	24.6	25.2	6.4		
salary base)	1981	30.7	32.0	8.1	47	220
(11–12 month	1979	28.6	28.8	10.4		
salary base)	1981	36.0	36.9	12.0	44	136
COLLEGES						
(9–10 month	1979	19.0	19.7	4.1		
salary base)	1981	25.6	25.4	5.4	46	29
SECONDARY SCHOOLS						
	1979	19.0	18.6	4.9		
	1981	23.3	23.3	6.3	43	58
INDUSTRY						
	1979	34.0	35.2	12.0		
	1981	43.6	45.3	14.2	44	320
GOVERNMENT						
	1979	33.8	34.8	9.0		
	1981	42.9	41.7	8.0	46	152
FFR&DC						
	1979	31.0	31.8	7.5		
	1981	38.7	39.7	8.4	43	135
NONPROFIT						
	1979	28.2	31.7	12.0		
	1981	39.0	41.2	14.0	44	26

[a] Data based on society members who responded in both 1979 and 1981, were full-time employed, and did not change employers in the years 1979–1981.

TABLE C-56. 1979 and 1981 salaries for members continuing in the same principal work activity.

Principal Work Activity 1979/1981	Salary Year	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
Teaching	1979	22.0	23.1	6.8		
	1981	28.0	29.4	10.6	45	330
Basic Research	1979	27.0	28.6	9.7		
	1981	35.8	36.6	10.4	43	313
Applied Research	1979	30.0	31.5	8.3		
	1981	39.9	40.2	9.0	41	244
Development	1979	32.2	32.8	8.5		
	1981	41.0	41.9	10.0	42	96
Design/Engineering	1979	30.2	31.8	10.9		
	1981	38.3	39.7	11.7	48	70
Administration	1979	40.0	42.4	14.1		
	1981	49.2	51.9	17.3	51	123
Other Activities	1979	29.1	32.0	13.5		
	1981	37.8	41.4	18.3	43	50

TABLE C–57. 1979 and 1981 salaries by sex and employment sector.[a]

	Salary Year	Sex	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)				
ACADEMIC	1979	Male	24.2	25.8	8.8		
		Female	19.1	20.7	7.0		
	1981	Male	31.0	32.7	10.4	45	424
		Female	22.9	25.7	8.4	43	24
NONACADEMIC	1979	Male	33.0	34.2	10.5		
		Female	26.7	27.9	8.1		
	1981	Male	41.6	42.8	11.8	44	496
		Female	35.1	35.2	9.1	44	19

[a] Data based on members who responded in both 1979 and 1981, were full-time employed, and did not change employers.

TABLE C–58. 1979 and 1981 salaries for members changing employers by employer type.[a]

	Salary Year	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)				
University to University	1979	18.0	20.7	8.4		
	1981	25.0	29.2	10.9	38	25
University to Industry	1979	16.0	18.5	8.0		
	1981	33.0	39.7	23.8	36	27
Industry to Industry	1979	28.8	31.5	12.8		
	1981	39.3	40.7	14.3	39	46

[a] The sample size of other employer types is too small to analyze.

TABLE C–59. 1979 and 1981 salaries for members changing selected work activity areas.

Work Activity	Salary Year	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)				
Teaching/Basic Research Administration	1979	29.3	29.2	10.5		
	1981	40.4	40.5	14.4	49	20
Teaching/Basic Research Applied Research	1979	17.8	19.3	6.3		
	1981	32.1	33.3	7.0	37	28
Teaching/Basic Research D,D,E & O[a]	1979	18.3	18.8	4.6		
	1981	32.5	30.9	8.2	37	18
A,D,D,E & O[b]	1979	26.0	25.8	7.9		
A,D,D,E & O	1981	36.0	35.1	8.3	37	25

[a] Includes Development, Design, Engineering and Other.
[b] In 1979 and 1981, these individuals were working in one of the following: Applied Research, Development, Design, Engineering and Other.

TABLE C–60. Society membership by professional self-identification, 1981.

	AAPM %	AAPT %	AAS %	ACA %	APS %	ASA %	AVS %	OSA %	SoR %
Physicist	88	77	27	17	74	21	37	52	8
Astronomer	—[a]	1	63	—	1	—	—	2	—
Engineer	4	5	2	4	9	44	39	30	51
Chemist	1	2	2	59	10	—	12	6	33
Biologist	1	—	—	5	—	3	—	1	1
Math & Computer Scientist	1	2	2	3	2	2	—	1	1
Other Scientist	4	1	2	11	2	21	6	6	6
Other	1	12	2	1	2	9	6	2	—
Total Number Known	**404**	**1029**	**424**	**342**	**3526**	**561**	**331**	**764**	**219**

[a] Blanks indicate that less than 1% of a society's members identify themselves with the noted group.

TABLE C–61. Type of employer by society, 1981.[a]

	AAPM	AAPT	AAS	ACA	APS	ASA	AVS	OSA	SoR
ACADEMIC	39	83	53	50	43	32	15	25	34
University	35	36	49	46	38	30	14	23	34
College	3	16	4	3	4	2	1	2	—
Junior College	1	9	—	1	1	—	—	—	—
Secondary School	—	22	—	—	—	—	—	—	—
NONACADEMIC	61	17	46	50	57	68	85	75	66
Industry & Self-Employed[b]	14	10	13	26	30	42	70	51	53
Government	14	4	15	12	12	18	4	12	6
FFR & DC	3	1	13	7	13	1	8	7	5
Nonprofit and Other[c]	30	2	5	5	2	7	3	5	2
Total Number Known[d]	**379**	**912**	**379**	**316**	**3080**	**474**	**300**	**642**	**188**

[a] Students have been excluded.
[b] Self-employment is included here for AAPM, ASA, OSA, and AVS. It represents approximately 5% of each of the totals respectively. See earlier section for description of the self-employed.
[c] The high proportion of AAPM members in "Nonprofit" and "Other" primarily reflects Hospital employment.
[d] Note that society totals here reflect the stratified over-sampling of the three smallest societies: AAPM, ACA and SoR.

TABLE C–62. Society membership by median age, 1981.

Society	Median Age in 1981
AAPM	38.7
AAS	39.2
OSA	40.6
ASA	42.0
SoR	42.3
APS	42.7
AVS	43.0
ACA	43.8
AAPT	44.6

APPENDIX D. Methodology

In May of 1981, the Manpower Statistics Division conducted its third annual survey of a random sample of the U.S. and Canadian resident membership of the nine AIP member societies. The 1979 sample was expanded in 1981 to include 17% of the membership, including 17% of those new members who joined a society during 1979 or 1980. In addition, the three smallest societies: American Association of Physicists in Medicine, American Crystallographic Association and the Society of Rheology, were oversampled by a factor of 2 to include 34% of their single-society members. A second questionnaire was sent in September to all nonrespondents to the initial questionnaire. Second wave respondents were asked to indicate their employment status as of the Spring of 1981. Of the 9550 members queried, 4974 responded to the first wave questionnaires and an additional 1617 responded to the second wave. The overall response rate ws 69%.

Stratification

The three smallest societies were oversampled to achieve a sample size large enough to permit a detailed analysis of their membership. This stratification was accomplished by selecting 34% of the single society members in these societies. To compensate for the overrepresentation of these society members in the overall respondent group, their data were weighted by 0.5 for all analyses except the individualized society descriptions reported in the concluding section of this report. For the purposes of that section, all members responding from a given society were included. Multiple society members belonging to one of the three smallest societies were weighted by the appropriate factor to achieve the known ratio of single versus multiple membership.

New Members

The 1980 survey was a follow-up of only those individual originally queried in 1979. During the sample expansion for the 1981 survey, efforts were made to include the appropriate proportion (17%) of those individuals who joined a society for the first time during 1979 or 1980. Due to an ambiguity in the fulfillment file documentation, however, only 12½% of the new members during 1979 and 16½% of the new members during 1980 were selected. Since the selection was random, the new member groups in the sample should still be representative of all new members joining during those two years. Thus, the descriptions of new members are probably valid. The undersampling of new members did, however, have some effect on comparisons between new and continuing members. When such comparisons were made, the new members were weighted to compensate for the known rate of undersampling.

Response Bias

As Table D–1 indicates, response rates varied substantially by subgroup. The expanded sample responded at a slightly higher rate than the original sample. Within the latter, those who had replied in both 1979 and 1980 were the most likely to respond again in 1981 (88%). Inconsistent respondents, those two subgroups who had responded to only one of the two prior surveys, were equally likely to respond in the third year (59%). Members who did not reply to either the 1979 or the 1980 survey, responded at the lowest rate in 1981 (37%).

All respondent subgroups from the original sample, including prior respondents who did not reply in 1981, were compared on several major characteristics in order to determine the possible effects of divergent response rates. These subgroups differed most significantly in the rate at which members dropped society affiliation (see Table D–2). Dropped membership rates were inversely related to the number of times the sub-

TABLE D–1. Response rates by sample subgroup, 1981.

	Sample Respondents N.	Wave 1 Respondents N.	Wave 2 Respondents N.	Total Number of Respondents	Response Rate %
Expanded Sample	5887	3132	1052	4184	71
Original Sample					
Responded in 1979 & 1980	1631	1203	232	1435	88
Responded in 1979	706	284	119	403	57
Responded in 1980	399	156	71	227	57
Did not respond in 1979 or 1980	927	199	143	342	37
Overall	9550	4974	1617	6591	69

group responded. Multiple respondent subgroups (those replying 2 or 3 times) were less likely than the overall membership to drop society affiliation. It should be noted, however, that the body of this report focuses exclusively on society members in good standing. Thus, this dropped membership bias would have no effect on the validity of our findings.

The 1981 survey, the third annual membership survey, marked the first time that a second questionnaire was sent to those individuals who did not reply to the original questionnaire mailed in the Spring. Comparisons of first and second wave respondents may be used as an indication of response bias. Second wave respondents from the expanded sample were less likely than first wave respondents to be physicists working in universities and more likely to be engineers working in industry. On the other hand, second wave respondents from the original sample reported employment-related changes more frequently than first wave respondents. However, both first and second wave multiple respondents were moving away from traditional university employment into more applied work in industry. Thus, the second wave improved the accuracy of this year's membership profile through the inclusion of relatively atypical members and a higher proportion of those members making career changes.

The preceding analysis, however, still leaves open the question of the effect of nonresponse on our sample. Obviously, nothing is known about members who never responded. However, to test the possible effects of nonresponse, hypothetical membership profiles were calculated based on the assumption that those members who never responded were like one-time respondents from the original sample. The results indicate that the society membership profile described in this report closely resembles the hypothetical profile with a slight overrepresentation of physicists and university employed members (approximately 1%), and a small underrepresentation of engineers and industry employed (less than 2%). The magnitude of these possible biases is small and they are generally in the direction of the career changes reported by multiple respondents. Therefore, the direction and magnitude of the changes cited in this report are probably indicative of the entire membership. It should also be noted that the hypothetical profile more closely resembles the second wave respondents than it does the first wave respondents. Thus, the second wave respondents make this report the most accurate of the three annual membership profiles published to date.

TABLE D–2. Rate of dropped membership by respondent subgroup, 1981.

Years of Response	Total Number	Dropped Membership during 1979 & 1980 N.	N.
1979, '80, & '81	1480	45	3.0
1979 & '80	207	11	5.3
1979 & '81	437	34	7.8
1980 & '81	249	22	8.8
1981 only[b]	337	—	—
1980 only	191	19	9.9
1979 only	377	74	19.6
Never Responded	813	223	27.4
Total	**4091**	**428**	**10.5**

[a] Does not include deceased or members who moved abroad from original 1979 sample.

[b] Original sample members who had dropped and did not respond in both 1979 or 1980 were not sent questionnaires because a current address was not available. These are the 223 dropped members under "never responded."

APPENDIX E. Definitions and Technical Notes

Employment status

All salary data are presented for individuals who are full-time employed in the U.S. only. Where feasible, academic salaries reported on a 9–10 month and 11–12 month salary base are presented separately. When overall figures are given, no special weighting factors have been attached. Other employment tables, which do not involve salary data, include both full-time and part-time employed U.S. and Canadian members unless otherwise noted.

Field and Subfield

The field and subfield list which was sent with the questionnaire was used by respondents to indicate the area in which they received their highest degree and their primary subfield of current work. In addition, individuals provided their major professional self-identification: physicist, astronomer, engineer, chemist, biologist, mathematician, computer scientist, other scientist, or other.

Median

The median, a measure which is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In Appendix C, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's salary figures.

Quantile Calculations

The SAS statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. It should be noted that SAS works with an ordered distribution of value points. In such an ordered distribution the median, for example, equals the central point in an odd-numbered distribution and a weighted value between the two middle points in an even numbered distribution.

Sampling Error

The percentages and other measures presented in this report may be affected by different sources of error. The possible effects of response bias were discussed earlier. Since these data are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both upon the size of the sub-group being examined and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification used in the sampling, slightly lower estimates resulted.

Proportions:

$$p \pm Z\sqrt{\frac{p(1-p)}{n}},$$

where

p = sample proportion observed,
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$$\bar{x} + Zs\sqrt{n},$$

where

$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Medians:

M_1, that point below which p_1^{th} values fall,
M_2, that point below which p_2^{th} values fall,

where

$$p_1 = p + Z\sqrt{\frac{p(1-p)}{n}},$$

$$p_2 = p - Z\sqrt{\frac{p(1-p)}{n}},$$

and

$p = 0.5$,
n = sample size,
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Examples:

(1) 35% of the Society members were employed by universities.

$$0.35 \pm 1.96\sqrt{\frac{0.35(0.65)}{5703}} = 0.34\text{–}0.36,$$

i.e., One can say with 95% confidence that the interval 0.34–0.36 covers the true proportion of society members employed by universities.

(2) The average salary for Ph. D. society members employed in industry was $44 800.

$$\$44\,800 \pm 1.96\frac{15\,100}{\sqrt{937}} = \$43\,800\text{–}\$45\,800,$$

i.e., One can say with 95% confidence that the interval $43 800–$45 800 covers the true mean salary of industrially employed Ph. D.'s in the society member population.

(3) The median age for all society members in 1980 was 41.8, based on a sample of 6167 with known age.

$p_1 = 0.51 \quad M_1 = 42.2,$

$p_2 = 0.49 \quad M_2 = 41.5,$

i.e., One can say with 95% confidence that the interval 41.5–42.2 covers the true median age in the society member population.

Interregional Mobility Preference Index

The discussion of geographic mobility was based, in part, on the result of the analysis of mobility patterns using the Preference Index.* This index assumes that the expected outmobility rate is the same for each region. It also assumes that interregional migrants are distributed proportionally to the population at the region of origin and the population at the region of destination. The Preference Index is defined as the ratio of the actual to the expected number of migrants between any two regions where the expected number is directly proportional to the population at both origin and destination. The preference index is computed as follows:

$$\text{P.I.} = \frac{M_{od}(EP_i - P_o)}{mP_oP_d} \times 100,$$

where

P_O = population at origin, O,
P_d = population at destination, D,
M_{od} = actual number of migrants from O to D,
EP_i = national population,
m = proportion of interregion migrants in the national population.

*Henry S. Shryock, Jr., *Population Mobility Within the United States.* Community and Family Study Center, University of Chicago, 1964.

APPENDIX F. Questionnaire Instruments and Subfield List

AIP MANPOWER STATISTICS DIVISION

1981 MEMBERSHIP SAMPLE SURVEY

PLEASE: Print numbers clearly in boxes as follows: 0123456789. For checkoffs, use the digit '1' in place of check marks. USE A NUMBER 2 PENCIL

BACKGROUND INFORMATION

(1) MAJOR PROFESSIONAL SELF-IDENTIFICATION (SELECT ONE)

PHYSICIST ☐ ASTRONOMER ☐ ENGINEER ☐ CHEMIST ☐ BIOLOGIST ☐ MATHEMATICIAN ☐ COMPUTER SCIENTIST ☐ OTHER SCIENTIST ☐ OTHER ☐

(2) LEVEL OF HIGHEST DEGREE: DOCTORATE ☐ MASTERS ☐ BACHELORS ☐ OTHER ☐

(3) DATE OF DEGREE: MONTH | YEAR ☐☐☐☐

(4) SUBFIELD OF DEGREE (SEE ATTACHED LIST) ☐☐☐ EXPERIMENTAL ☐ THEORETICAL ☐ NEITHER ☐

(5) IF STUDENT: INDICATE ☐

(6) DATE OF BIRTH: MONTH | DAY | YEAR ☐☐☐☐☐☐

(7) SEX: MALE ☐ FEMALE ☐

(8) CITIZENSHIP: UNITED STATES ☐ CANADIAN ☐ NON-US PERMANENT VISA ☐ NON-US TEMPORARY VISA ☐

(9) RACE/ETHNIC: WHITE ☐ BLACK ☐ NATIVE AMERICAN INDIAN ☐ MEXICAN AMERICAN ☐ PUERTO RICAN ☐ ORIENTAL ☐ OTHER ASIAN ☐ OTHER ☐

CURRENT EMPLOYMENT STATUS

(10) ARE YOU CURRENTLY: EMPLOYED — FULL TIME ☐ PART TIME ☐; NOT EMPLOYED — SEEKING ☐ NOT SEEKING ☐; RETIRED ☐

(11) IF POSTDOC: INDICATE ☐

(12) FIELD OR SUBFIELD OF WORK (SEE ATTACHED LIST)

		EXPERIMENTAL	THEORETICAL	NEITHER
PRIMARY	☐☐☐	☐	☐	☐
SECONDARY	☐☐☐	☐	☐	☐

(13) TYPE OF WORK ACTIVITY (INDICATE PRIMARY WITH "1" AND SECONDARY WITH "2".)

ADMINISTRATION ☐ DESIGN/ENGINEERING ☐ DEVELOPMENT ☐ APPLIED RESEARCH ☐ BASIC RESEARCH ☐ TEACHING ☐ OTHER ☐

(14) ANNUAL SALARY (US or CDN $) ☐☐☐☐☐ IF ACADEMIC INDICATE SALARY BASE: 9-10 MOS ☐ 11-12 MOS ☐

(15) PLEASE PRINT FULL NAME OF EMPLOYER

EMPLOYER ZIP CODE ☐☐☐☐☐

PLEASE DO NOT MARK THESE BOXES ☐☐☐☐☐☐

(16) TYPE OF EMPLOYER

UNIVERSITY ☐ COLLEGE ☐ JUNIOR COLLEGE ☐ SECONDARY SCHOOL ☐ INDUSTRY ☐ GOVERNMENT ☐ FEDERALLY FUNDED R & D CENTERS (e.g. Argonne) ☐ NON-PROFIT ☐ SELF-EMPLOYED ☐ OTHER ☐

→ IF ACADEMIC, answer a and b

a) PRIMARY ACADEMIC RANK: PROFESSOR ☐ ASSOC PROF ☐ ASST PROF ☐ LECTURER/INSTRUCTOR ☐ RESEARCH ASSOCIATE ☐ ADMINISTRATOR ☐ OTHER ☐

b) TENURE STATUS: TENURED ☐ TENURE LINE ☐ OTHER ☐

AIP MANPOWER STATISTICS DIVISION

MEMBERSHIP SAMPLE SURVEY
1981 UPDATE

PLEASE

Print numbers clearly in boxes as follows:
0123456789
For checkoffs, use the digit '1' in place of check marks
USE A NUMBER 2 PENCIL

IMPORTANT: REPORT CHANGES MADE BETWEEN **MARCH 1980** AND **MARCH 1981** ONLY.

PART A

HAVE YOU MADE ANY CHANGES IN THE AREAS LISTED IN PART B SINCE MARCH 1980?

If NO ☐ please fill in salary information and return form in enclosed envelope.

If YES ☐ please fill in salary information and indicate new status only in the relevant areas in Part B below.

SALARY INFORMATION: AS OF MARCH 1981

ANNUAL SALARY ☐☐☐☐☐ (US or CDN $)

IF ACADEMIC INDICATE SALARY BASE 9-10 MOS ☐ 11-12 MOS ☐

THANK YOU

PART B

IF CHANGES HAVE BEEN MADE SINCE MARCH 1980, PLEASE INDICATE *NEW* STATUS(ES) ONLY.

1 TYPE OF WORK ACTIVITY? (INDICATE PRIMARY WITH "1" AND SECONDARY WITH "2".)

ADMINISTRATION ☐ DESIGN ENGINEERING ☐ DEVELOPMENT ☐ APPLIED RESEARCH ☐ BASIC RESEARCH ☐ TEACHING ☐ OTHER ☐

2 EMPLOYER?

PLEASE PRINT FULL NAME OF *NEW* EMPLOYER.

_____

_____

EMPLOYER ZIP CODE ☐☐☐☐☐

PLEASE DO NOT MARK THESE BOXES ☐☐☐☐☐☐

TYPE OF EMPLOYER

UNIVERSITY ☐ COLLEGE ☐ JUNIOR COLLEGE ☐ SECONDARY SCHOOL ☐ INDUSTRY ☐ GOVERNMENT ☐ FEDERALLY FUNDED R & D CENTERS ☐ (eg. Argonne) NON-PROFIT ☐ SELF-EMPLOYED ☐ OTHER ☐

3 FIELD OR SUBFIELD OF WORK? (SEE ATTACHED LIST)

		THEORETICAL	EXPERIMENTAL	NEITHER
PRIMARY	1) ☐☐☐	☐	☐	☐
SECONDARY	2) ☐☐☐	☐	☐	☐

4 ACADEMIC RANK?

a) PRIMARY ACADEMIC RANK

PROFESSOR ☐ ASSOC PROF ☐ ASST PROF ☐ LECTURER/ INSTRUCTOR ☐ RESEARCH ASSOCIATE ☐ ADMINISTRATOR ☐ OTHER ☐

b) TENURE STATUS

TENURED ☐ TENURE LINE ☐ OTHER ☐

5 EMPLOYMENT STATUS?

EMPLOYED: FULL TIME ☐ PART TIME ☐

NOT EMPLOYED: SEEKING ☐ NOT SEEKING ☐

RETIRED ☐ POSTDOC ☐ STUDENT ☐

6 NEW HIGHEST DEGREE?

A) LEVEL OF DEGREE: DOCTORATE ☐ MASTERS ☐ BACHELORS ☐ OTHER ☐

B) DATE OF DEGREE: MONTH ☐☐ YEAR ☐☐

C) PRIMARY SUBFIELD OF DEGREE (SEE ATTACHED LIST) ☐☐☐ EXPERIMENTAL ☐ THEORETICAL ☐ NEITHER ☐

7 MAJOR PROFESSIONAL SELF-IDENTIFICATION?

PHYSICIST ☐ ASTRONOMER ☐ ENGINEER ☐ CHEMIST ☐ BIOLOGIST ☐ MATHEMATICIAN ☐ COMPUTER SCIENTIST ☐ OTHER SCIENTIST ☐ OTHER ☐

8 CITIZENSHIP?

UNITED STATES ☐ CANADIAN ☐ NON-US PERMANENT VISA ☐ NON-US TEMPORARY VISA ☐

SUBFIELD LIST

PHYSICS & ASTRONOMY

001 ASTRONOMY
040 ASTROPHYSICS
070 ACOUSTICS
100 ATOMIC AND MOLECULAR PHYSICS
130 BIOPHYSICS
160 CHEMICAL PHYSICS
190 CRYSTALLOGRAPHY
220 ELECTROMAGNETISM
250 ELECTRONICS
280 ELEMENTARY PARTICLES & FIELDS
310 FLUID DYNAMICS
350 GEOPHYSICS
380 HIGH POLYMER PHYSICS
410 LOW TEMPERATURE PHYSICS
440 MATHEMATICAL PHYSICS
470 MECHANICS
500 MEDICAL PHYSICS
530 NUCLEAR PHYSICS
560 OPTICS
590 PLASMA PHYSICS
620 RHEOLOGY
650 THERMAL PHYSICS
680 SOLID STATE PHYSICS
740 VACUUM SCIENCE
760 PHYSICS, GENERAL
790 PHYSICS EDUCATION, PRE-COLLEGE
800 PHYSICS EDUCATION, COLLEGE
820 PHYSICS, OTHER

ENGINEERING

835 AERONAUTICAL & ASTRONAUTICAL
840 CHEMICAL
845 ELECTRICAL
850 ELECTRONIC
855 ENVIRONMENTAL
860 MECHANICAL
865 NUCLEAR
870 SYSTEMS
890 ENGINEERING, GENERAL
891 ENGINEERING, OTHER

OTHER SCIENCE

895 BIOLOGICAL SCIENCE
900 CHEMISTRY
905 COMPUTER SCIENCE
910 EARTH & ENVIRONMENTAL SCIENCE
912 GENERAL SCIENCE, EDUCATION
915 MATERIALS SCIENCE
920 MATHEMATICS & STATISTICS
925 PSYCHOLOGY
945 SCIENCE ADMINISTRATION
950 SCIENCE, OTHER

OTHER AREAS

955 EDUCATIONAL ADMINISTRATION
975 OTHER ADMINISTRATION
999 NON-SCIENCE, OTHER